Engineering Library

MAY 13 1937

MOTOR AGE

A CHILTON PUBLICATION
DEVOTED TO THE INTERESTS OF THE INDEPENDENT REPAIR SHOP

MAY
1937

IN THIS ISSUE

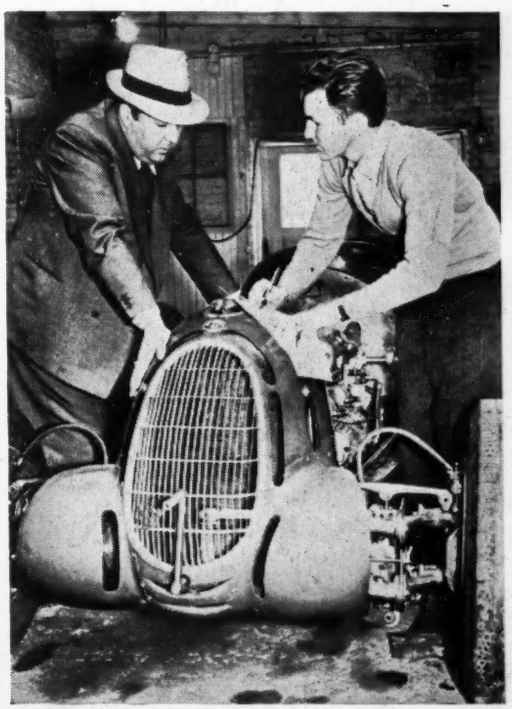
Pointers for Ignition Setters

Advice on breaker point adjustment and ignition timing explaining cam angles and firing intervals of current model cars.

A B C's of Shop Bookkeeping

The first of a series of articles on business accounting in the independent repair shop. An explicit outline of a simple but complete bookkeeping system.

Rex Mays (right) who has held the pole position for two successive years at Indianapolis signs to drive Bill White's Alfa Romeo in the 500-Mile Classic, May 31.



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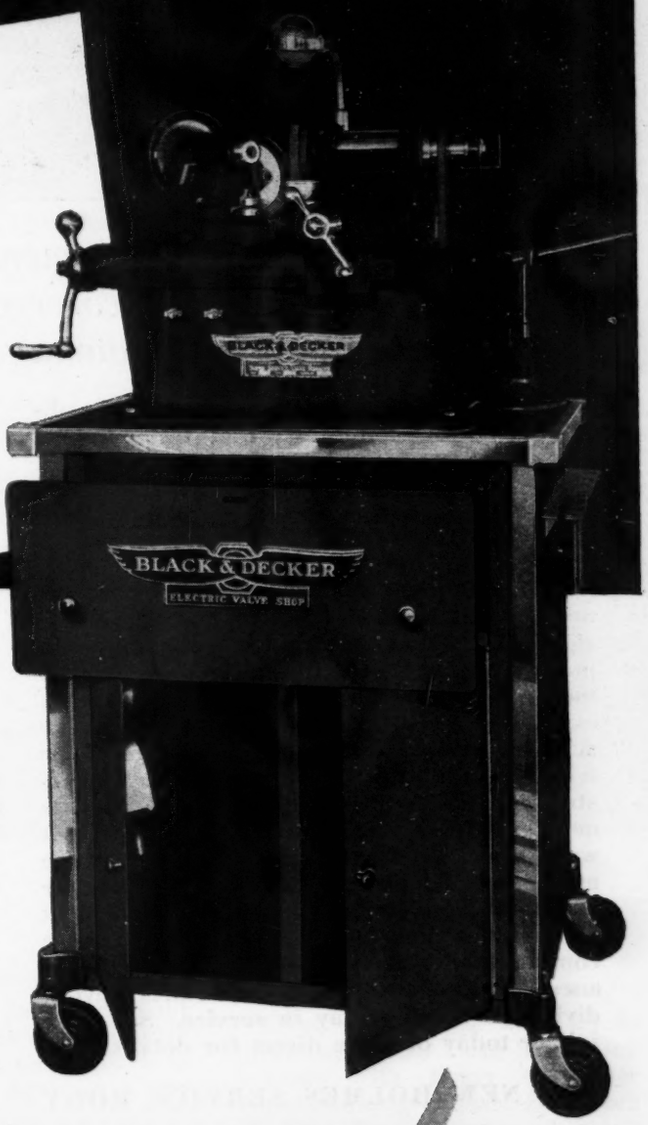

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MOTOR AGE

DEVOTED TO THE INTERESTS OF THE INDEPENDENT REPAIR SHOP

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MOTOR AGE

MAY 1937

SHOP TALK

Duryea Honored

In Springfield, Mass., the other day, there was a parade and banquet in honor of Charles E. Duryea, who built the first car, only 45 years ago. U. S. Rubber Co., presented Mr. Duryea with a plaque and a tablet was unveiled at 47 Taylor Street where the first gasoline buggy had its initial pulling test. At the banquet, Julian Chase, directing editor of the Chilton automotive publications spoke of his experiences with one of the first Duryeas built.

Cleveland Contacts

Stopped off in Cleveland the other day and saw Mark Graves. A swell guy with a nice shop. Does general repairs with special emphasis on brakes and clutches. Just now, Mark is all in a sweat to get a filling station approach to his service business. As field representative for Nash, Mark, in his early days, covered the United States from border to border. After lunch with Mark I went to see Jack Humphries, out on 91st Street.

The Trade That Jack Built

Jack doesn't like the "let your gas pump feed your shop" idea. He prefers getting the customers by the direct mail route and then selling them an inspection service contract at so much per. Jack built up one of the best businesses in Cleveland by that method and is now starting over again at a new location.

Hypoid Hysteria

McKeighan of Elco Grease and Oil is worried about hypoids. Claims that within a year there will be plenty of trouble as the result of improper lubricants. Cites cases of bronze thrust washers disappearing completely as the result of chemical action.

Cincinnati Comments

From Cleveland I went on to Cincinnati where I had interesting sessions with Baker of Baker Wheel and Axle and also Earl Koch of Auto Brake Service. I didn't have time to stop off in Portsmouth, Ohio, to see Bill Hedges, who has the cleanest shop in this so-called land of the free, but I called him on the 'phone and got enough dope for a story which will be in an early issue of MOTOR AGE.

Bill Toboldt

Distributor and Flywheel Positions for Synchronizing Ignition Distributors

Car and model	No. of degrees on distributor that movable points open after stationary points have opened	No. of degrees on flywheel that movable points open after stationary points have opened	Firing interval on distributor*
Six - cylinder models unless otherwise specified	60 deg.	120 deg.	Equal, 60 deg.
Straight eights unless otherwise specified	45 deg.	90 deg.	Equal, 45 deg.
Auburn 12	22½ deg.	45 deg.	22½, 37½, 22½, etc.
Cadillac V-8	45 deg.	90 deg.	Equal, 45 deg.
Cadillac V-12	37½ deg.	75 deg.	37½, 22½, 37½, etc.
Cadillac V-16	22½ deg.	45 deg.	Equal, 22½ deg.
Cord V-8	45 deg.	90 deg.	Equal, 45 deg.
Ford V-8	.....	.....	Equal, 45 deg.
Franklin V-12	30 deg.	60 deg.	Equal, 30 deg.
LaSalle V-8	45 deg.	90 deg.	Equal, 45 deg.
Lincoln V-8	60 deg.	120 deg.	60, 30, 60, etc.
Lincoln V-12	32½ deg.	65 deg.	32½, 27½, 32½, etc.
Marmon V-16	22½ deg.	45 deg.	Equal, 22½ deg.
Nash Twin Ign. 8	Same time	Same time	Equal
Oakland V-8	Same time	Same time	Equal
Packard 1931, 1932	Same time	Same time	Equal
Packard 12	33½ deg.	67 deg.	33½, 26½, 33½, etc.
Pierce-Arrow 12	20 deg.	40 deg.	20, 40, 20, etc.
Lincoln Zephyr	37½ deg.	75 deg.	22½, 37½, 22½, etc.

Note: To obtain firing interval on flywheel multiply values in column on right by 2.

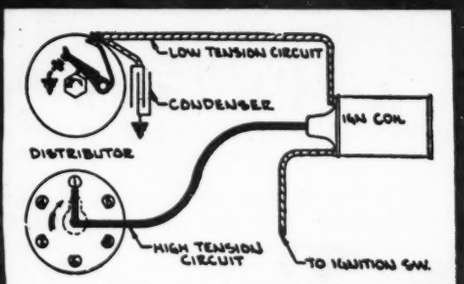


Fig. 1. The simplest type of ignition system employs a breaker cam having as many lobes as there are cylinders

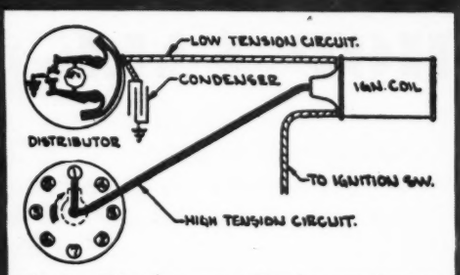


Fig. 2. This type uses a breaker cam having as many lobes as there are cylinders and two breaker arms in parallel. One set opens slightly later than the other

Pointers On Breaker Points For Ignition Setters

When timing ignition, equipment helps tell the story on cam angles and firing intervals

BREAKER point adjustment and ignition timing is one of the most frequently performed jobs on an automobile. As compression pressures and engine speeds become greater, the necessity for accuracy of ignition setting also becomes increasingly important. For that reason shops have found it necessary to install special equipment to check and test ignition distributors, coils and condensers.

However, before it is possible to do a good job of setting breaker points, the points themselves have to be in good condition and regardless of how accurately a set of points may be trued up and cleaned by a mechanic, it will be impossible to get good high speed performance, if the rubbing block has become worn and the points themselves have been materially worn or filed away. The reason for this is that the quality of the spark at the plugs depends on the breaker points being closed for a certain length of time and open for a certain length of time. This varies with different engines and the number of degrees the points are closed is known as the cam angle.

If the breaker points are not closed long enough, the current will not flow through the primary winding of the ignition coil for a sufficient length of time to thoroughly magnetize the core, which in turn results in a weak spark.

The thickness of the breaker points, the height of the rubbing block and the condition of the distributor cam will all affect the cam angle, and are taken into considera-

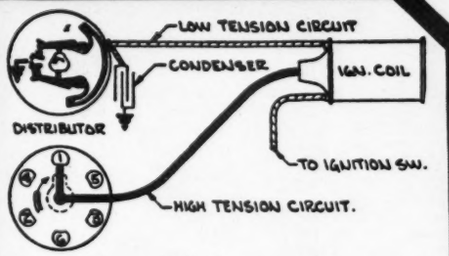


Fig. 3. There are half as many lobes on the breaker cam as there are cylinders in this system. One breaker arm fires half the cylinders and the other arm fires the other cylinders

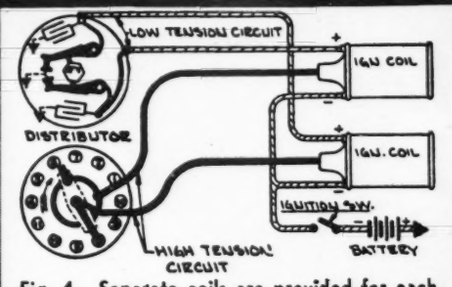


Fig. 4. Separate coils are provided for each set of breaker points on this system and there are half as many lobes on the breaker cam as there are cylinders

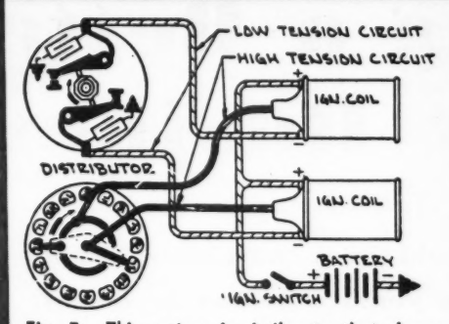


Fig. 5. This system is similar to that shown in Fig. 4, except that the breaker cam has as many lobes as there are cylinders and the contact points open at the same instant. This type of distributor is used for dual ignition systems

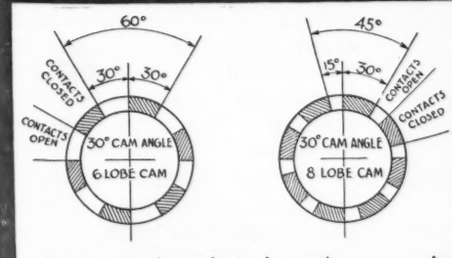


Fig. 6.—At the right is shown the cam angle for a conventional 6 cylinder car while the cam angle for an eight is shown at the right. The shaded portions represent the period during which the points are closed

By BILL TOBOLDT

tion when specifying the breaker point gap. Therefore, when the height of the rubbing block or the thickness of the breaker points has been reduced as the result of wear or the distributor cam is worn the gap specified by the manufacturer will no longer be correct and will not give the most effective cam angle. In addition there is always the possibility of error in setting the gap by means of a feeler gage. For those reasons it is advisable to set breaker points by means of instruments and also why it is preferable to install new sets of breaker points rather than recondition the old ones.

As previously mentioned the cam angle varies with the number of cylinders and is defined as the number of degrees through which the distributor cam revolves while the breaker points remain closed. The longer the contacts remain closed the more the core will become magnetized but also the greater the coil will heat. It is also necessary to set the cam angle to such a degree that the high tension spark occurs when the rotor blade is opposite the proper segment in the distributor cover. Only one cam setting is correct when all of these factors are considered.

In regard to distributors there are two general types, single breaker and double breaker. The double breaker arm ignition units are of different types, which are shown in the illustrations.

While some ignition units have both breaker arms in fixed relationship to each other so that the time of opening of one set of points cannot be changed in relation to the opening of the other set of points, the majority of distributors have one fixed set of points and one movable set of points. This makes it necessary to time each set separately so that the time of opening of the two sets of points occurs at the proper instant and the points are synchronized. Naturally if one set of points is timed too early or too late, the spark in those particular cylinders will be correspondingly too early or too late.

Just where the movable set of points should be timed in relation to the stationary set of points depends on the engine. On straight eights the movable points open 45 deg. of distributor shaft rotation or 90 deg. on the flywheel after the stationary points have opened. On V-type engines it depends on the number of cylinders and also on the angle between the two banks of cylinders.

The timing interval between the stationary and movable points is given in the accompanying table. One interval (on the flywheel) is always the angle between the cylinder blocks, and the other is easily calculated as follows: Divide 1440 by the number of cylinders of the particular engine. From that answer, subtract the angle between the cylinder blocks and that gives the other interval on the flywheel.

For example to find the firing interval between the opening of the two sets of points on the Lincoln

(*Continued on page* 58)

Building a Better Battery Business

E. L. Hawkins, an old timer, who has sold batteries for eighteen years tells how he does it

BUYING a battery is like going to the dentist — when you've got to go, you've got to go! When a man's tooth makes him feel as though he was kicked in the face by an impolite mule — only then does he hustle off to some reliable dentist. And, by and large, that's how car owners buy batteries.

That is E. L. Hawkins' viewpoint, and he ought to know for he has been retailing batteries for 19 years. Yes, Mr. J. Motoring Public generally waits 'til battery trouble starts, and yells for help and being ready to meet these emergencies is one reason why this comparatively small electrical repair shop in Germantown, Philadelphia, does a $40,000 annual volume of business. Of this total sales volume, batteries are the most profitable year-in and year-out item, Mr. Hawkins says.

Well, how come Mr. Hawkins, your shop does $40,000 annual volume including batteries—it can't all be emergency business? Of course, it isn't. But the trick in selling batteries rests on two factors — *being ready* and *being reliable.*

Reliability is the word for Hawkins and everything about his shop. Here's how he got that way:

"We've handled one line of batteries for more than 18 years.

"Our shop has been located in the same spot—a good location in the business section of Germantown—through all these years.

"We service everything electrical on the car.

"We are authorized factory service representatives for many well-known automotive electrical parts, devices and accessories.

"We carry a stock of electrical parts, batteries and supplies.

"Our shop is completely equipped with modern shop appliances.

"We don't quibble with the customer. He can't be right all the time but we still believe that a satisfied customer is our best ad.

"We know our trade and our trade knows us.

"Speaking of advertising, we've advertised regularly in local Germantown papers for more than five years.

"We use direct mail advertising and take advantage of factory prepared merchandising and selling helps.

"We display and demonstrate in every way we know how.

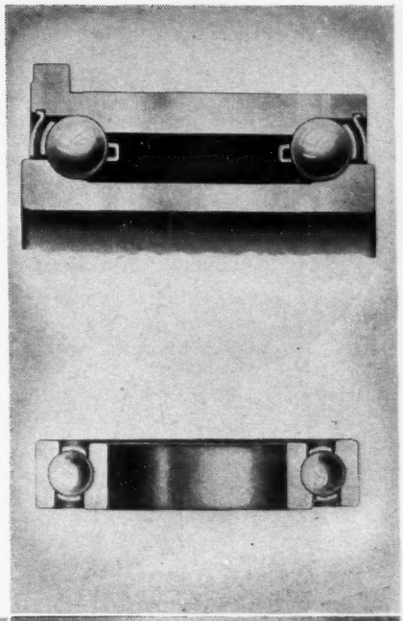
"Our shop is cleaned and kept in order by the day.

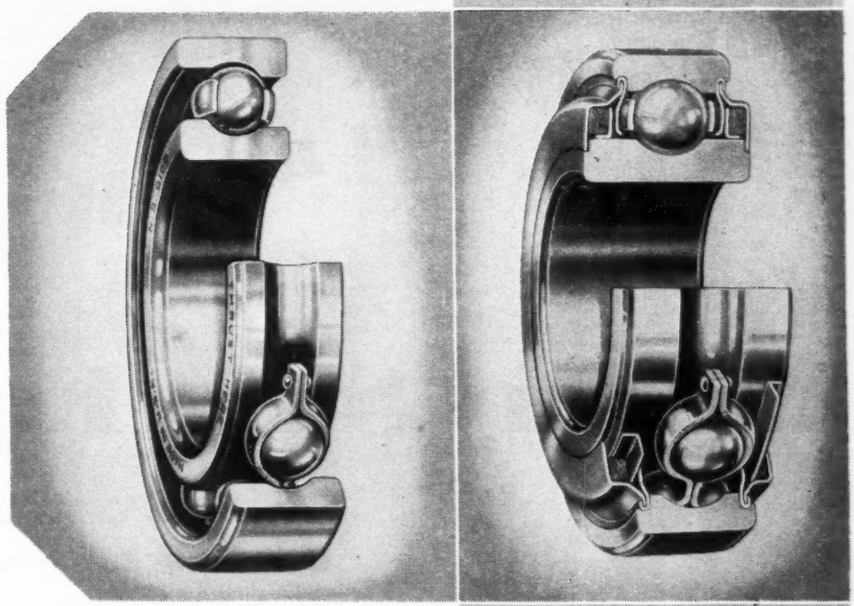
"Our men are satisfied workmen and know how to sell electrical service and supplies.

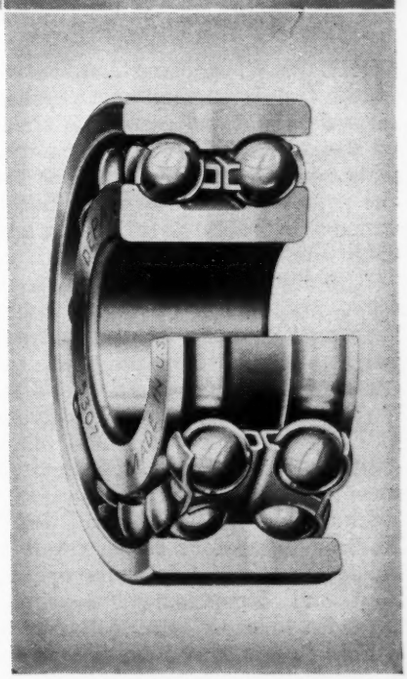
What Is a Pre-loaded Bearing?

Here's the answer —

By ***BOB HANKINSON***







Above—N. D. Difrax bearing, designed to take radial and thrust loads. Top of column, reading down—one row of wide double-row shielded and preloaded pinion shaft bearing; differential side bearing; lubricated for life and shielded axle shaft bearing; double-row, preloaded pinion shaft bearing without shield.

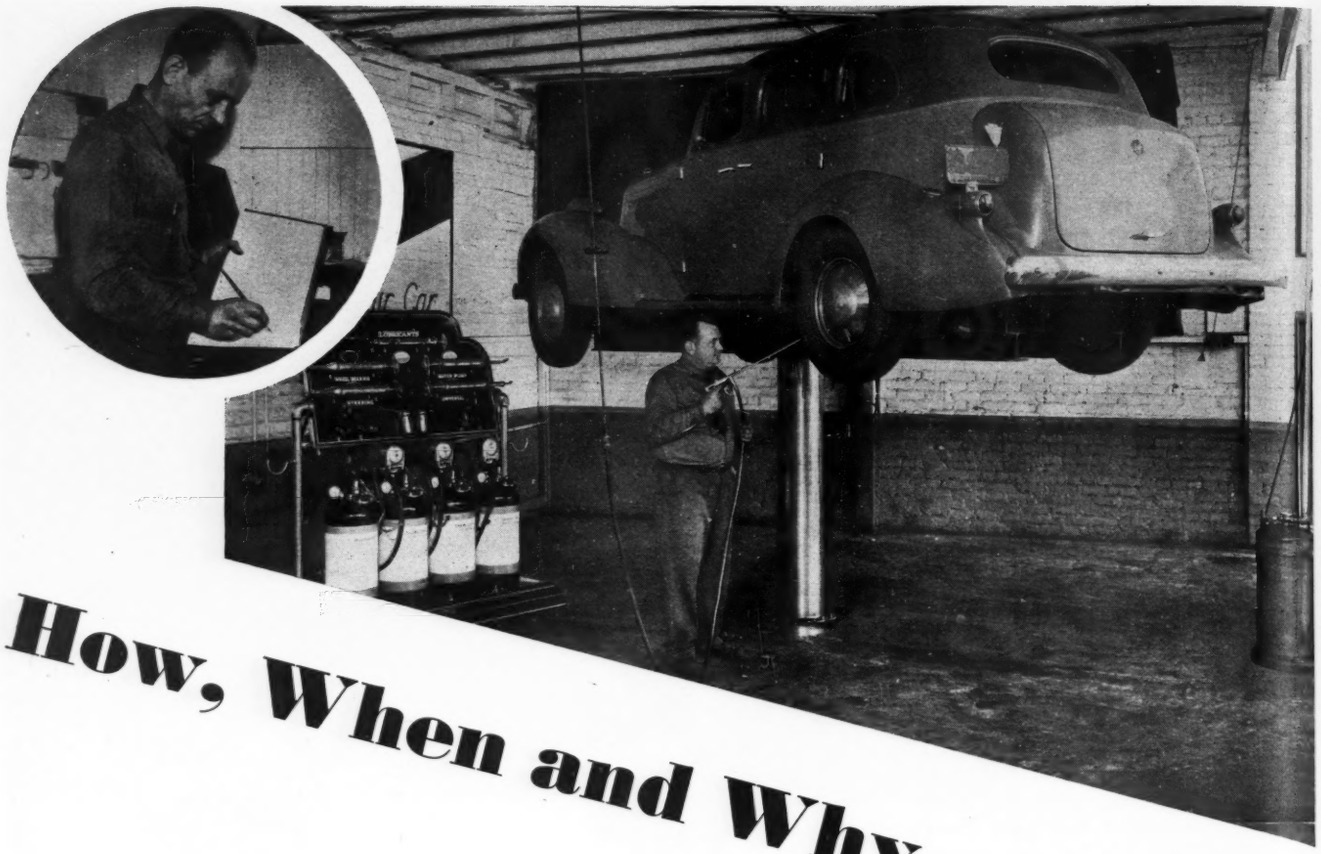
WHEN it comes to deciding whether a ball bearing is suitable to be reinstalled in the job or whether it is worn out and should be thrown away, a fellow has to know his bearings in order to make the right decision, and the adoption of pre-loaded bearings hasn't simplified the job by any means. The various types of ball bearing construction make it necessary that a mechanic be familiar with the characteristics of each type so that he will know just what to look for and what to disregard in his inspection of a bearing.

Some ball bearings, particularly the double row type that are used on the differential pinion shaft, are known as the pre-loaded type—that is, they are constructed so that a light load is placed on the balls of the bearing, or so that when they are installed on a shaft the inner cone of the bearing will expand slightly and place a light load on the balls. The amount of pre-load placed on the balls as the result of construction is slight, the main loading taking place as the result of assembly requiring a tight press fit on a shaft.

These bearings are intended to be entirely free of endplay, and if an inspection reveals that a slight amount of endplay exists the bearing should be replaced with a new one. Endplay cannot be permitted in a pinion shaft bearing, as the pinion must be held rigidly to its adjustment with relation to the ring gear, and if endplay exists it will be impossible to secure a quiet adjustment.

Rear axle shaft ball bearings are usually of the single row type, and are constructed to take the radial as well as the thrust loads imposed on the rear axle. Bearings in use at the present time are of the pre-lubricated type, which means that they cannot be washed out with gasoline when they are inspected, as such treatment would wash out the lubricant that was installed when the bearing was built, and there is no way to re-lubricate the

(Continued on page 58)



How, When and Why

We Buy Shop Equipment

Breaking down parts and labor sales, studying equipment earnings helps this west coast shop make money

THE W. W. Madison Automotive Service is a small service shop located outside the business district of Berkeley, Calif.—a "hole in the wall" shop, if you please—that for the past 11 years has never failed to make a profit for its owner, and chief mechanic, "Bill" Madison.

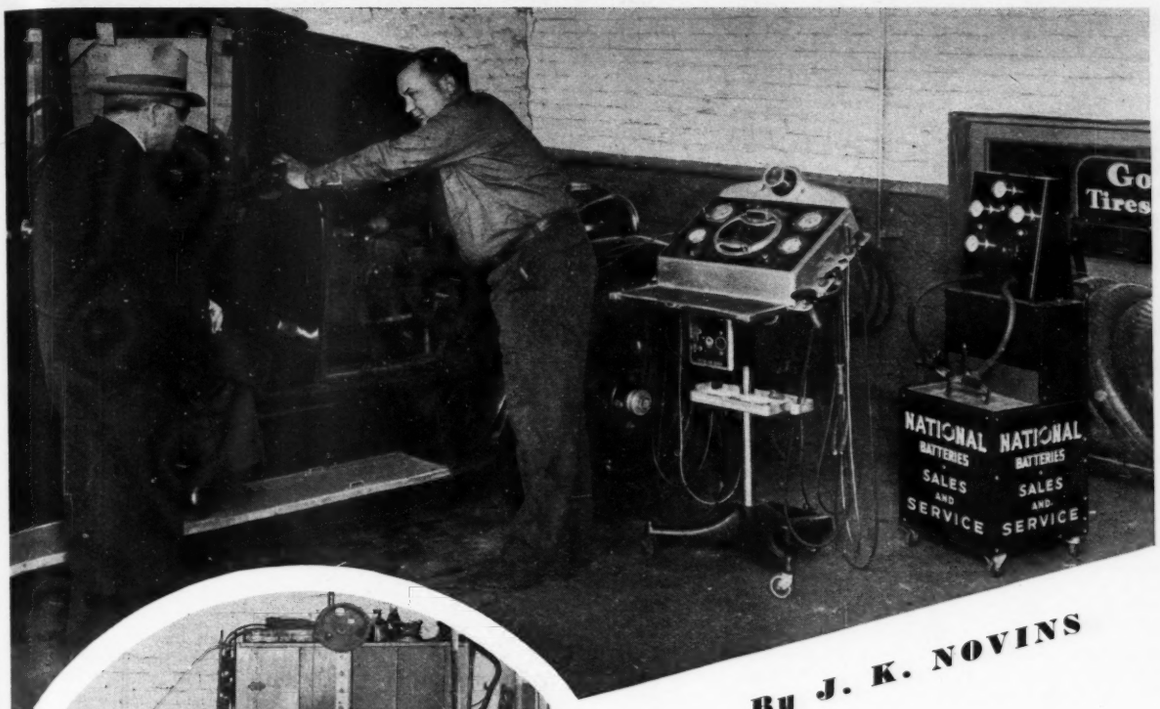
Although a small shop, with three men and a part-time bookkeeper, it is well equipped and departmentized, and like any successful business many times its size, the W. W. Madison Automotive Service operates on the basis of a daily and monthly breakdown of revenue in each department.

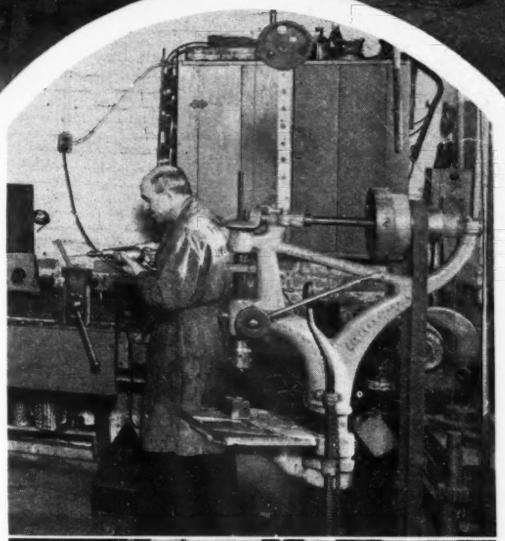
At the end of each month "Bill" Madison has before him a detailed breakdown, for the following operations and departments: Gasoline, batteries, grease, labor, oil, headlights, parts, paint, service, storage, tires, washing, and welding.

He goes even further, as on cash sales the breakdown is made daily, the bookkeeper making the entries on the "breakdown list" from the cash slips. The breakdown of charge business is made during the month, at the time the bookkeeper prepares the customers' statements.

"This method of breaking down parts and labor sales has been our salvation," says the service shop proprietor. "For one thing, it had given us the most reliable check-up on the value of the shop equipment. Every piece of equipment has been bought, or replaced, after consulting the breakdown record. We don't wait until the equipment has become worn out or obsolete before replacing it. The best time to make the replacement, in my opinion, is just as soon as it falls short of earning the desired revenue. This we can tell by referring to the monthly breakdown figures.

"Some years ago we spent $600 installing a particular piece of equipment. We did not get enough out of this equipment simply because our service shop is not ideally located to get the kind of business that equipment performed. We studied the monthly figures of revenue, compared them with the cost of the equipment, and determined what it would cost to farm out the work to a specialized establishment.





By J. K. NOVINS

Bill Madison runs his three-man shop with big-business system, keeping daily records of his sales by departments. His "breakdown" records have been an important factor in building up service revenue, and making his equipment pay its way.

"We got a good price for that equipment because we disposed of it while it was in good condition, and used the money to furnish up a motor testing laboratory. We plan also to install a wheel aligning unit.

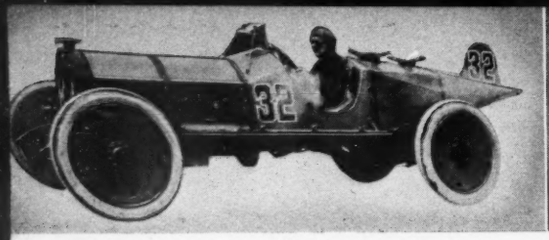
"Our motor test unit has been very profitable, not only in earning additional revenue, but also because it furnishes profitable contacts for our mechanical department.

"Some years ago the shop was equipped with an old-type testing bench. In time the equipment outlived its usefulness. We disposed of it. During the depression we turned our attention to the building of a gas station at the entrance to the shop, also a modern greasing department. Both have been profitable, and helped to take up the slack in the mechanical department during the peak of the depression.

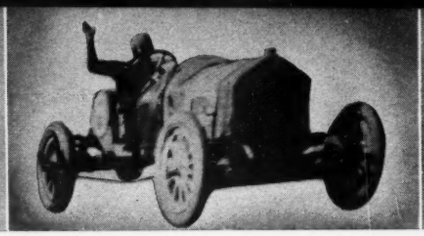
"We have also given our attention to the building up of accessory sales. One of the things we did was to establish a little section in the shop where we display batteries, fan belts, tires and other items that could easily be sold to the car owners when they come in for service. Not long ago we conducted a tire campaign in cooperation with well-known tire manufacturers. During two weeks we sold $900 worth of tires. This was done simply by displaying the tires prominently, by talking tires to all of our customers, and by calling up our regular customers to tell them of the values.

"It is not always practicable to replace heavy equipment, which costs a lot of money. However, we always try to give the impression that we have new equipment, so that customers will get the idea that we are progressive. Nowadays a customer expects good work when

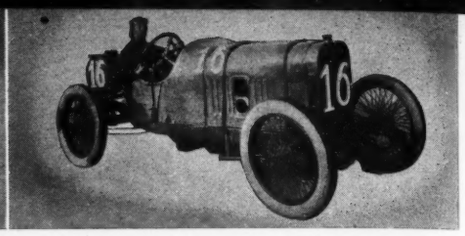
(*Continued on page* 58)



1911 Ray Harroun, first hero. Today he's an inventor of automotive accessories. He lives in Detroit



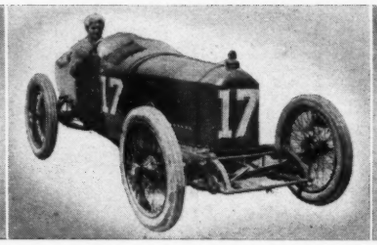
1912 Joe Dawson home first. Today Joe's an active racing official and a serviceman in Philadelphia



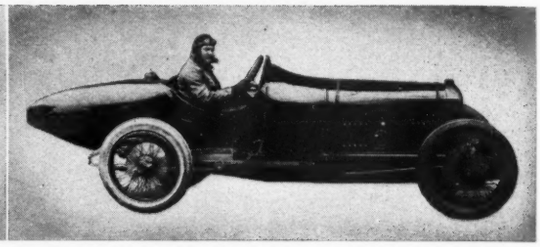
1913 Jules Goux, the French invader, won. He is now a manufacturer's representative in Paris

Speed's Silver Jubilee

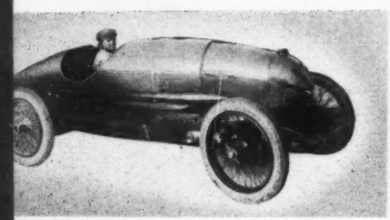
1915 Ralph DePalma set a 89.84 mph. mark that stood till 1922. Genial Ralph lives in New York



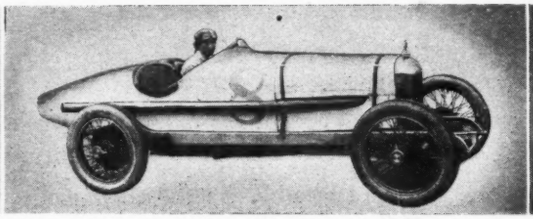
1916 Dario Resta, of international fame, led the way. Later killed at the Brooklands track, Eng., 1924



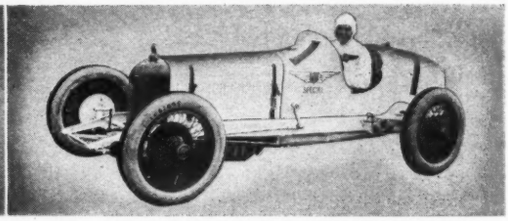
1919 Howdy Wilcox, the winner. He died of injuries after a crack-up at Altoona, Pa., 1923



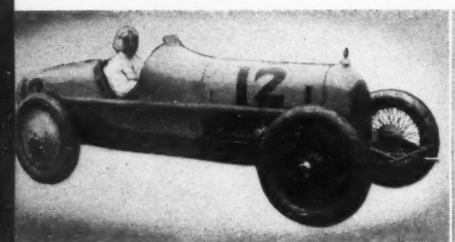
1921 Tommy Milton's first victory. Today he's service engineer for Packard Motor Car Co.



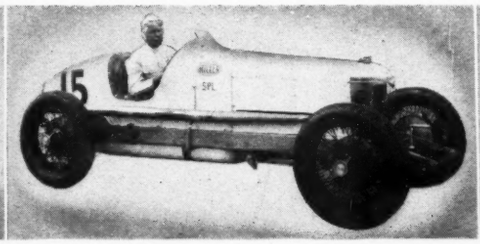
1922 Jimmy Murphy took it that year. A great driver, he was killed at Syracuse in 1924



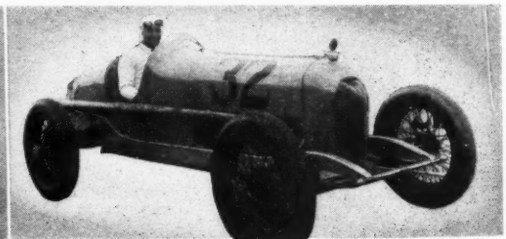
1923 Tommy Milton wins again! He was the first man to win twice. Louie Meyer was only a kid then



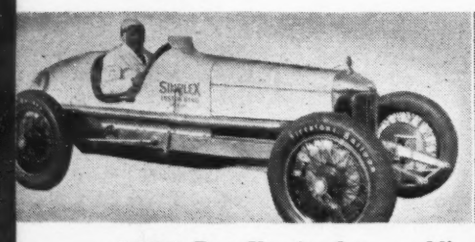
1925 Peter DePaolo, victor. Today he's with Hastings Mfg. Co. and author of "Wall Smacker"



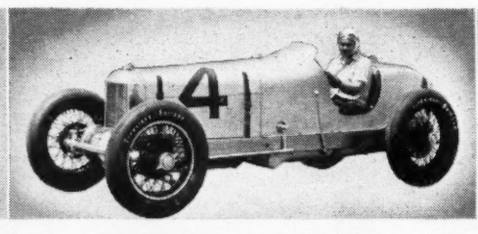
1926 Young Lockhart from out of the West. Frank was killed in speed trials at Daytona Beach, 1928



1927 George Souders victorious. Living today in Lafayette, Ind., but hasn't raced since 1928



1929 Ray Keech, then world's land speed record holder, won. Killed at Altoona, Pa., 1929.



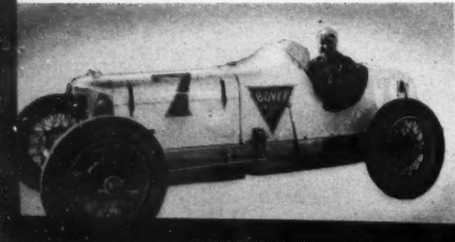
1930 Billy Arnold rolled to victory. Today, Billy is connected with the sales dept. of Chrysler Corp.

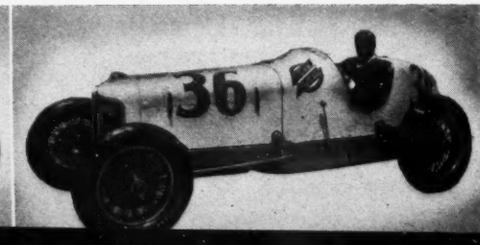
1931 Louis Schneider after Arnold and Gullota, the leaders, hit the wall. Drives midgets today

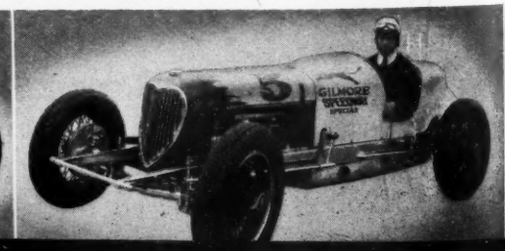
1933 Louis Meyer with his second win. A cautious driver, he gives safety lectures in off-seasons

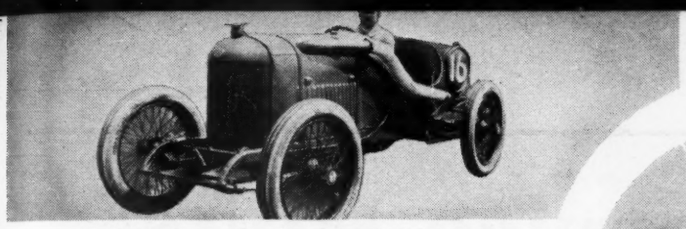
1934 Bill Cummings rode down "victory lane." Still active, Bill sells automobiles between races

1935 Kelly Petillo's year. Kelly says he has retired but has a car entered this year; Roberts will drive it



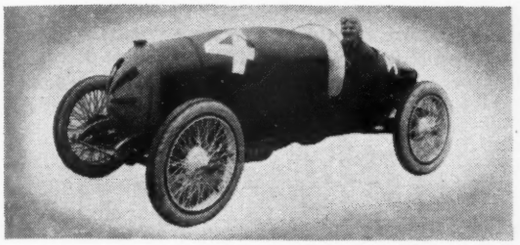




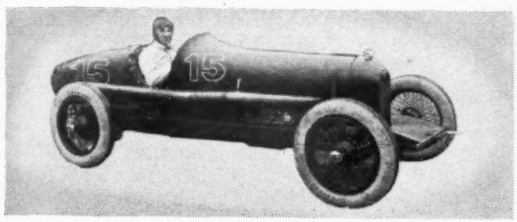


1914 Rene Thomas, of France, conquered American speedsters. He is retired today, living in Paris

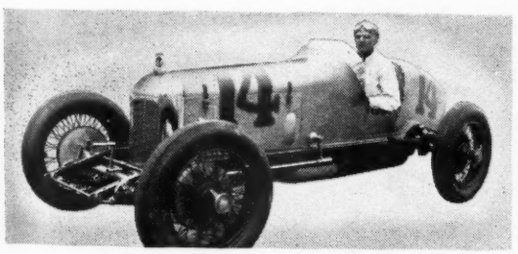
Flipping the pages of racing history with the winners and their cars. "Page 1937" is wide open for the victor in the 25th 500-mile auto race at Indianapolis, May 31



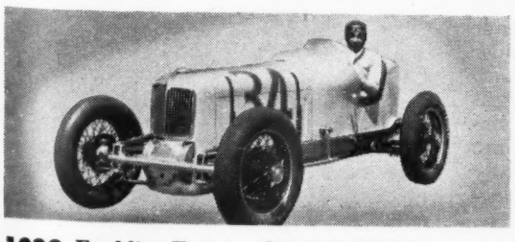
1920 Gaston Chevrolet in the car his brothers built. Killed at Culver City Speedway in 1920



1924 Joe Boyer shared honors with L. L. Corum. Boyer killed at Altoona, 1924. Corum living today

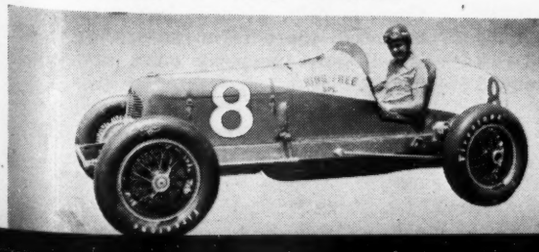


1928 Louis Meyer, unknown mechanic and relief driver hung up the first of his three victories



1932 Freddie Frame flagged first. Lives in California and is employed in experimental work

1936 Louis Meyer three times! He's driving in 1937 with his brother, Harry, as riding mechanic

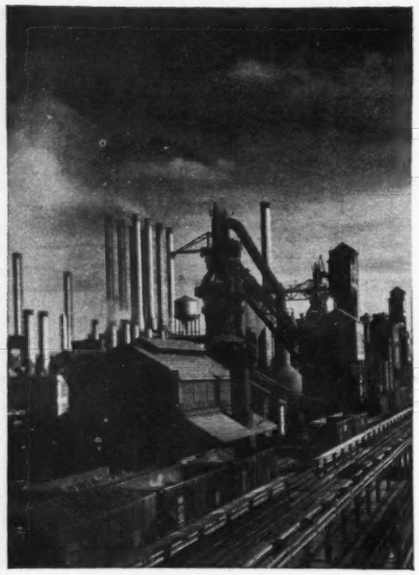


YESTERDAY

TODAY

Indianapolis Winners

Year	Car and Driver	Engine	Piston Displacement	M. P. H. Average
1911	Marmon, Ray Harroun	6 cyl. 4.5 x 5	447.1	74.59
1912	National, Joe Dawson	4 cyl. 5 x 6.25	490.8	78.7
1913	Peugeot, Jules Goux	4 cyl. 4.248 x 7.875	446.13	76.92
1914	Delage, Rene Thomas	4 cyl. 4.13 x 7.08	380.2	82.47
1915	Mercedes, Ralph De Palma	4 cyl. 3.620 x 6.5	274	89.84
1916	Peugeot, Dario Resta	4 cyl. 3.62 x 6.65	274	83.26
1919	Peugeot, Howard Wilcox	4 cyl. 3.6 x 6.7	274.6	88.06
1920	Monroe, Gaston Chevrolet	4 cyl. 3.125 x 5.9375	182.5	88.50
1921	Frontenac, Tommy Milton	8 cyl. 2.625 x 4.093	182.5	89.62
1922	Murphy Special, Jas. A. Murphy	8 cyl. 2.685 x 4	181.44	94.48
1923	H. C. S. Special, Tommy Milton	8 cyl. 2.344 x 3.5	120.75	90.95
1924	Duesenberg, L. L. Corum and J. Boyer	8 cyl. 2.38 x 3.422	122.9	98.23
1925	Duesenberg, Peter De Paolo and Norman Batten	8 cyl. 2.38 x 3.421	121.7	101.13
1926	Miller, Frank Lockhart	8 cyl. 2.1875 x 3	90.2	95.88
1927	Duesenberg, George Souders	8 cyl. 2.296 x 2.75	91.086	97.54
1928	Miller, Louis Meyer	8 cyl. 2.187 x 3	90.158	99.482
1929	Simplex P. R. Special, Ray Keech	8 cyl. 2.187 x 3	90.2	97.585
1930	Miller-Hartz Special, Billy Arnold	8 cyl. 2.613 x 3.5	150.5	100.448
1931	Bowes Seal Fast Special, Louis Schneider	8 cyl. 2.625 x 3.5	150.7	96.629
1932	Miller-Hartz Special, Fred Frame	8 cyl. 2.775 x 3.5	182	104.144
1933	Tydol Special, Louis Meyer	8 cyl. 2.3125 x 3.750	258	104.162
1934	Boyle Products Special, Bill Cummings	4 cyl. 4.1250 x 4.1250	220	104.863
1935	Gilmore Speedway Special, Kelly Petillo	4 cyl. 4.250 x 4.625	262	106.240
1936	Ring Free Special, Louis Meyer	4 cyl. 4.250 x 4.5	255	109.069



Service Hints

From the Factories

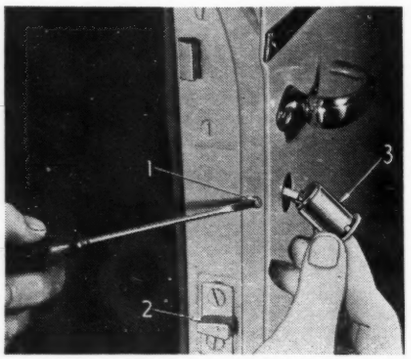
Olds Idle Adjustment

WHEN operating in cold sections of the country, some Oldsmobile F-36 engines will continue to idle at a high rate of speed, even though the engine has been permitted to operate for a sufficient length of time to bring the engine up to operating temperature. While this condition may sometimes be the result of a stuck throttle shaft, in others it is due to insufficient heat being applied to the automatic choke thermostatic spring to cause it to raise the fast idle block and link assembly high enough to permit the slow idle adjusting screw to come to rest against the carburetor body casting. To overcome the trouble, remove the fast idle block and link assembly from the carburetor and from the lower or tapered end of the link, remove a strip ⅛ in. wide. The end of the link should not be retapered to a fine edge but the edges should be cut with fine file to remove burrs. This change should permit the engine to come to a full closed throttle position in a short time after starting.

"Hey! Shut this darn thing off!"

Removing Dodge Door Lock Cylinders

TO remove door lock cylinders on 1937 Dodge cars, loosen set screw 1, Fig. 1402, in inch of door frame. Pull out lock cylinder 3. To reinstall, put a long needle through the trim



panel and on through the lock cylinder hole in the door. Press the end of the lock shaft against the needle and allow the needle to go back through the door. The needle serves as a guide for easily leading the lock shaft into the proper hole in the latch locking mechanism. Then tighten the lock cylinder set screw when the cylinder flange is tight against the door panel.

Ford Water Pump Impeller

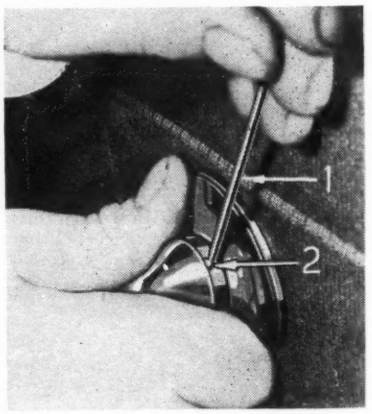
IT is very important in case of any pump impeller failure on 1937 Ford engines, that a thorough check be made for any obstruction in the cylinder block which road conditions and also the force of circulating water might bring in contact with the pump impeller. A casual inspection is not enough since the obstruction is usually forced back into the block by the revolving impeller. It is also very important that in case of impeller breakage on the 60 h.p. motor water pump that you be sure to retrieve both parts of the broken impeller. Locating any foreign material or obstructions can be done by removing the hose at the water inlet connection in the block and checking from this point with a small light as well as checking through the pump hole. Then flush the block through the cylinder head water outlet with high pressure water omitting the pump from the block and also disconnecting the inlet hose from the block.

Chevrolet Oil Pan

EVERY time the oil pan on the 1936 and 1937 Chevrolet engine is removed, it is necessary to check the oil nozzle height for connecting rod dipper clearance by means of a special duck gage. The oil trough height should also be checked with a gage. Other gages are available for checking the aiming of the oil nozzle.

Removing Dodge Inside Handles

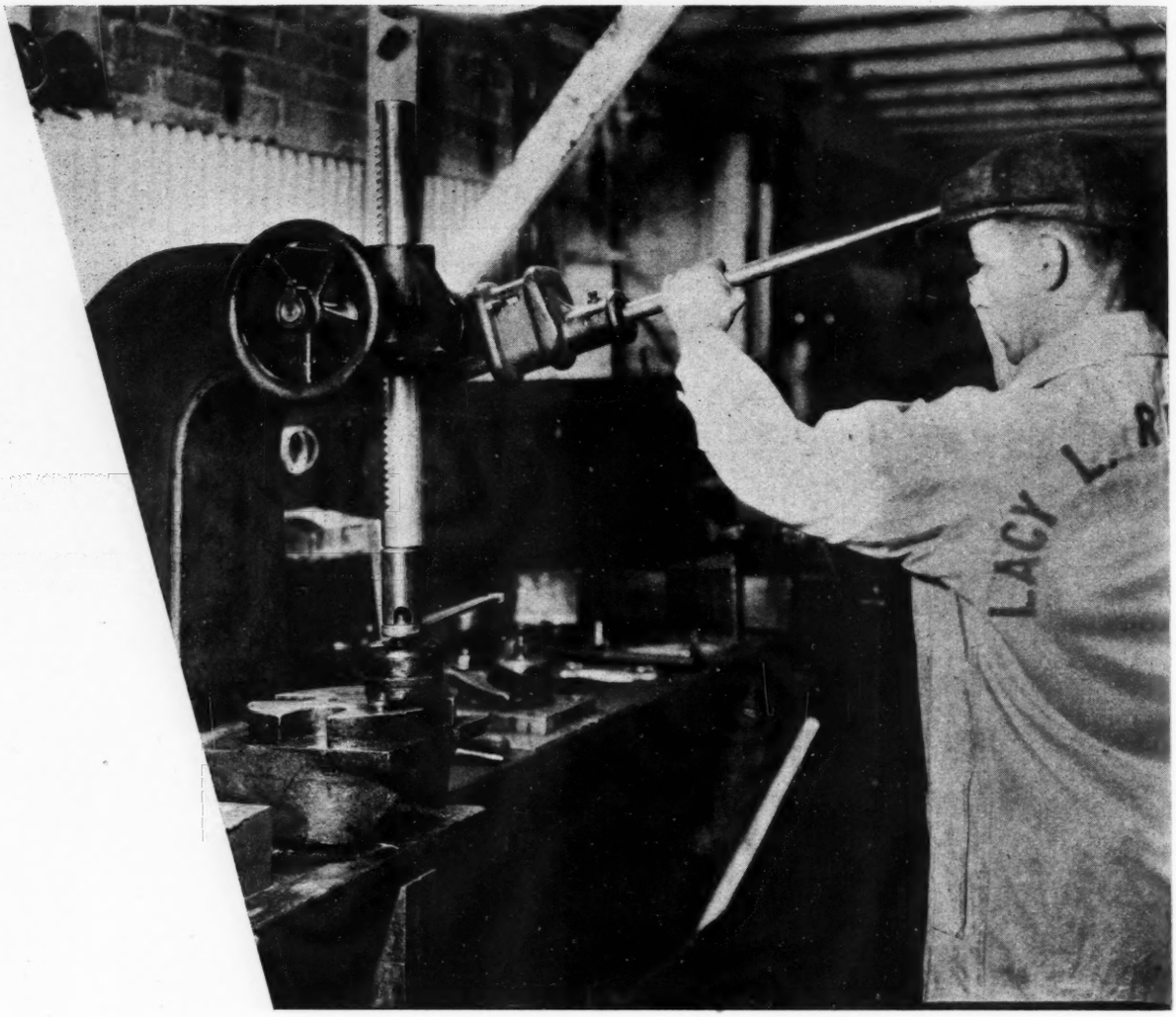
TO remove inside handles on 1937 Dodge cars, first press the escutcheon plate against the trim panel exposing the pin which holds the handle to the shaft. Push the pin out of the shaft with a slim rod and the handle and escutcheon plate can then be pulled off the shaft.



Chevrolet Carburetor

CHEVROLET nozzle unit and choke valve unit of the Carter carburetor should always be installed in pairs, neither unit having previously been used. The reason for this is that the screw nozzle takes its length from being pressed into the slip nozzle. Consequently, after it has once been mounted, there is no assurance that it will seat properly on a new slip nozzle.

"It's a coronation—we're installing a new king bolt!"



Servicing Houdaille Shocks

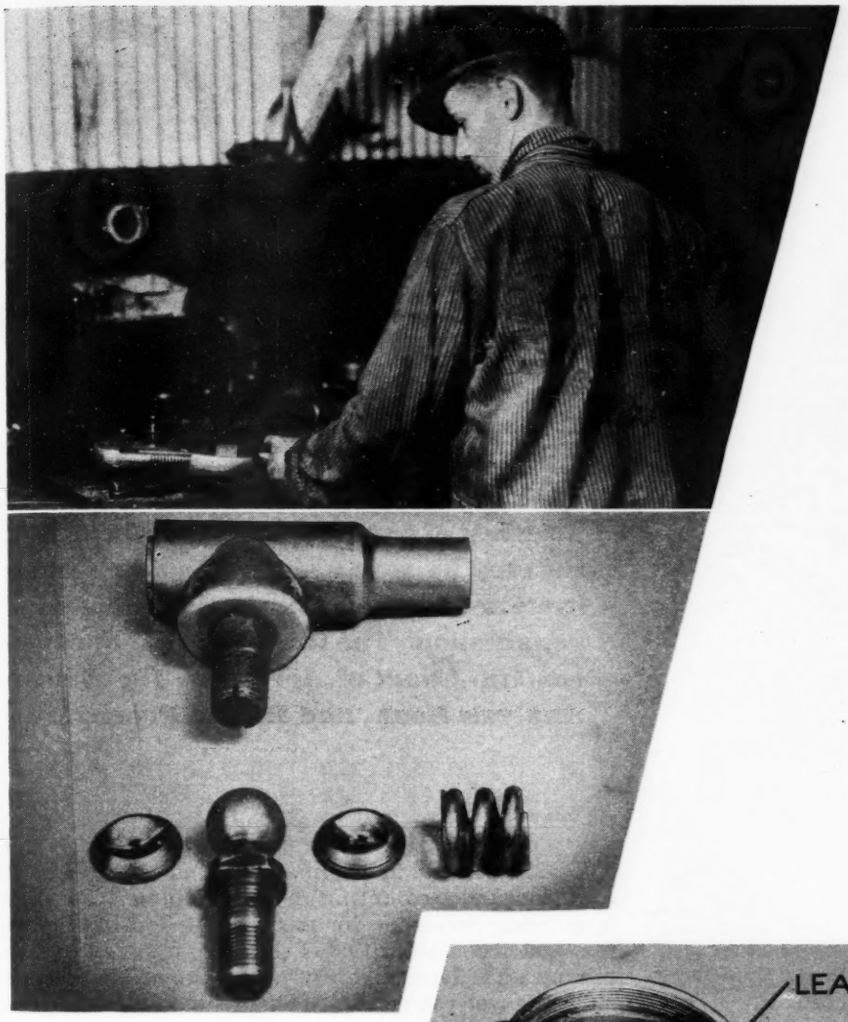
A résumé of the service procedure for adjusting these units perfectly and profitably

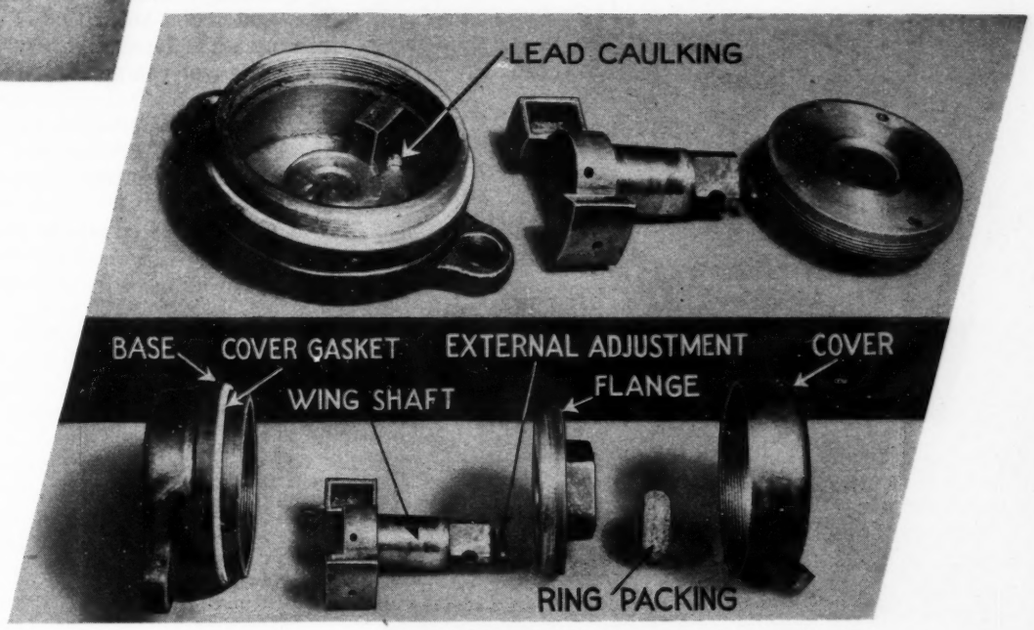
MAINTENANCE on Houdaille shock absorbers is relatively simple and in most cases consists of disassembling, cleaning, reassembling and filling with Houdaille shock absorber fluid. Unless the shocks have run dry for a considerable period, the only parts that require replacement are two gaskets, one for the cover and the other for the wingshaft.

However, before dismantling a shock absorber, the car should be carefully checked so as to be sure that the trouble is actually in the shock absorber and not in the chassis springs, a frozen shackle or improperly inflated tires, as all of these points have a marked effect on the riding qualities of a car. In fact, a car with a lot of squeaks and rattles will seem to ride hard and it is, therefore, up to the mechanic to check the car carefully to ascertain the cause of the poor riding qualities. In this connection, it is advisable to lubricate the chassis, taking care to free up all shackles, otherwise it will be difficult, if not impossible, properly to adjust the shocks and obtain a good ride.

Houdaille shock absorbers have an external adjustment which controls the amount of fluid passing through the ports in the wingshaft. This adjustment has a right-hand thread and turning it in a clockwise direction reduces the amount of fluid passing through the port and consequently stiffens the ride, while screwing out the adjustment will provide a softer ride.

The adjustment is placed at the external end of the wingshaft and on most instruments is fitted with a pointer, a series of numbers being stamped on the nut that holds the shock absorber lever in place. On other instruments, a square nut





Opposite page: Pressing on a shock absorber arm. Top: Removing case, if special tool is not available.

is used to control the adjustment.

It is advisable to adjust these shock absorbers in the spring to prepare for summer driving conditions and again in the fall to prepare for the winter. When making the adjustment, the mechanic should be careful to adjust both front shock absorbers the same and, naturally, both rear shock absorbers should be given the same adjustment. However, the setting of the front and rear instruments is generally different.

Whenever the shock absorbers are adjusted, each instrument should be first filled with Houdaille shock absorber fluid. The manufacturer advises that the smaller size shock absorbers should be refilled every 5000 miles, the medium size every 7500 miles and the largest size every 10,000 miles to insure proper operation.

If the shock absorbers appear to be noisy, they should be disconnected from the axles and then if the noise continues when the car is driven over a rough road, the noise is undoubtedly coming from some other part of the chassis. However, if the noise stops, it is generally conclusive that the trouble is in the shock absorbers or the connecting links.

The connecting links are fitted with ball studs which operate in spring-backed bronze cups. Naturally, when these cups become worn or in case the spring is broken, noise will result and it will be necessary to replace these parts. In some few instances, the noise will be in the shock absorber itself. This can be cured by removing the filler plug, screwing in the adjustment until the needle valve is seated and then driving the car over a rough road, after which the adjustment is turned to its original setting, the reserve chamber is refilled and the filler plug installed.

When it becomes necessary to remove Houdaille shock absorbers, each one should be marked so that they can be reinstalled in the same place from which they were removed. Furthermore, it is not advisable to install a shock absorber that has been removed from an-

(Continued on page 76)

The ABC's

The first of a series of articles describing step by step a simple bookkeeping system designed for the independent repair shop. The first installment covers The Chart of Accounts, The Sales Analysis Book, and Billing Procedure

That bookkeepping is tedious and difficult is an old-fashioned idea. Modern methods, such as the plan outlined in these articles, have greatly simplified business accounting

MOST essential today, in any kind of business, is an adequate accounting or bookkeeping system. It is not only necessary for purposes of figuring income tax, and social security tax, but also assists in determining what departments of a shop are making money. A simple yet complete system is suggested herewith. It is adequate to keep proper records for the small individually owned auto repair shop which also deals in gasoline, oil, grease, etc. Of course, cash registers and special accounting equipment will assist in simplifying such work.

A Chart of Accounts is the first step and this chart is the base of all records. Tabulated below is a chart which can be used by any small shop.

Statistical Accounts

1 SALES
- 11 Gasoline
- 12 Oil, grease
- 13 Alcohol, prestone, etc.
- 14 Parts
- 15 Towing
- 16 Tires, tubes, etc.
- 17 Storage
- 18 Outside work
- 19 Labor
- 20 Miscellaneous

3 EXPENSES
- 31 Wages
- 32 Rent
- 33 Telephone
- 34 Interest
- 35 Insurance—company
- 36 Insurance — compensation
- 37 Maintenance of autos
- 38 Depreciation of autos
- 39 Office supplies, postage, stationery
- 310 Advertising
- 311 City and state taxes
- 312 Social Security tax
- 313 Gasoline
- 314 Oil, grease
- 315 Antifreeze preparations
- 316 Parts
- 317 Tires, tubes, etc.
- 318 Outside work
- 319 Miscellaneous
- 320 Depreciation—furniture & fixtures
- 321 Depreciation—machy., tools & equipment

4 OTHER INCOME
- 41 Discounts earned
- 42 Miscellaneous

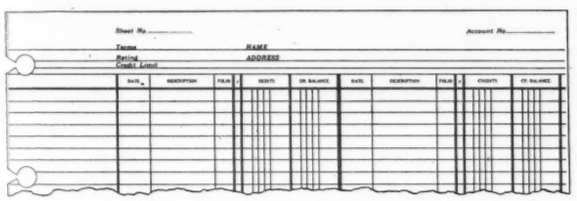
Assets
- 100 Cash in bank
- 200 Accounts receivable
- 300 Inventory
- 400 Automobiles
- 401 Furniture & fixtures
- 402 Machinery, tools & equipment

Liabilities
- 500 Accounts payable
- 600 Notes payable, bank
- 601 Notes payable, equipment
- 602 Accrued Social Security tax
- 700 Reserve depreciation furn. & fix.
- 701 Reserve depreciation autos
- 702 Reserve depreciation machy., tools & equip.
- 800 Drawing account — proprietor
- 900 Net worth

By H. W. HANKINSON

# of Shop Bookkeeping

A General Ledger should be made next from this chart. This will consist of a loose leaf canvas binder and a separate ledger sheet for each of the accounts listed in the chart, with the name and number of the account written thereon. Below is a ledger sheet suitable for this purpose and can be obtained from any stationery store and in various sizes.



Form No. 1

Before going into the system further, it would be well to establish a foundation upon which to build the business. This is done by determining the value of the different Assets and Liabilities. In other words, a Balance Sheet must be made in the following way:

On a separate paper, write down the amount of Cash in Bank, the amount of money owed to you from your customers on charge accounts, which is called Accounts Receivable, the value of Inventory or Stock on Hand for resale, the total value of the Automobiles connected with the shop, the value of Furniture and Fixtures, which consists of desk, chairs, typewriter, adding machine and whatever equipment there is in the office, and lastly, the value of Machinery, Tools and Equipment, such as jacks, hoist, head light tester, tire rack, wheel aligner, etc. Add all these figures together and the total is termed "Total Assets."

On another sheet of paper, write down the amount of money you owe for merchandise bought for resale, which is called Accounts Payable, the amount of money borrowed from the bank, which is called Notes Payable, Bank, and the amount of money owed on equipment bought on notes, which is called Notes Payable, Equipment. Add all these figures together and the total is called "Total Liabilities." Subtract this total from "Total Assets" and the difference will be called "Net Worth." These separate figures should now be transferred or written down on the corre-

(*Continued on page* 56)

BOOKS NEEDED
For The System

Sales Analysis Book
Cash Book
Gasoline Record Book
Check Book
***Accounts Receivable Ledger**
***Accounts Payable Ledger**
***General Ledger**
Social Security Record Book

***These three may be kept in the same binder.**

Glossary of Terms

DEBIT—the charge side of the account. To debit an account is to charge that account. A debit entry is made on the left side of the account.

CREDIT—as the name implies, an item of credit value to the business. To credit an account is to indicate the amount of value applied to the account, usually to offset a previous charge. A credit entry is made on the right side of the account.

CONTROL ACCOUNT—a name given to an account that needs a detailed explanation to support it. In other words, the Accounts Payable Account in the general ledger is a Control Account, but is made up of all the various individual accounts to which the company owes money.

ENTER—to make a record of a transaction.

POST—transfer figures from one book or sheet to another. At the end of the month the totals of the Cash Book are posted to the General Ledger sheets.

GROSS PROFIT—the difference between the cost of the material or labor, and the selling price.

NET PROFIT—the difference between the Gross Profit and all overhead expenses.

BALANCE SHEET—a statement of the condition of the business at a given date.

PROFIT & LOSS STATEMENT—shows the profit or loss made during a certain period.

SELLING SERVICE

By Frank P. Tighe

THESE are practical merchandising ideas that have been used by maintenance men — just like yourself. Workable ideas gathered from here, there and everywhere and presented for practical application to your business. Use them and write us your experience for publication herein.

Master Tool Chest

BURR QUITZO, service manager at the J. A. Eichman Garage, Madison, Wis., has constructed a master mechanic's tool box which he believes is a model in effectiveness because it helps him to keep all tools in place at all times.

This master tool chest stands 6 ft. high, is built of hard oak, is 4 ft. wide and 2 ft. deep.

The arrangement of the chest provides for a large drawer at the top 4 ft. wide and 19 in. high. There are 15 other drawers in the chest; some are 2 ft. wide and about 2½ in. deep inside. Two drawers are 6 in. deep and the large one at the bottom is 8 in. deep. The whole chest has a bar locking device which fits down the front, locking every drawer.

"I made the whole chest myself," he tells us. "The chief advantage of it is that I can keep my tools free from dust and in a place where they won't get lost so easily. I divide my tools, as for example, all the valve tools in one drawer. This makes them easy to find. It saves me time when I work."

Mr. Quitzo also has a smaller box of tools ready for emergency calls.

Service Samaritans To the Rescue

EMERGENCY road service ofttimes necessitates caring for the injured, rendering first aid, extinguishing fires and many another Good Samaritan act. Service men experienced in wrecking service can no doubt recall the times when they were required to perform many an unusual task at the scene of an accident.

Ormsby Chevrolet Company of San Antonio, Tex., aware of this, has a wrecking crew who, in addition to being expert mechanics, are able to render first aid service to the injured,

should it be needed. The men are thoroughly trained and regularly examined by the State Red Cross Board. To be able to render the exact kind of service needed, when it's needed, is the secret of most business successes. The wrecking crew shown on the opposite page includes mechanics Mike Romero, Archie Earl and Marvin Smith, standing left to right.

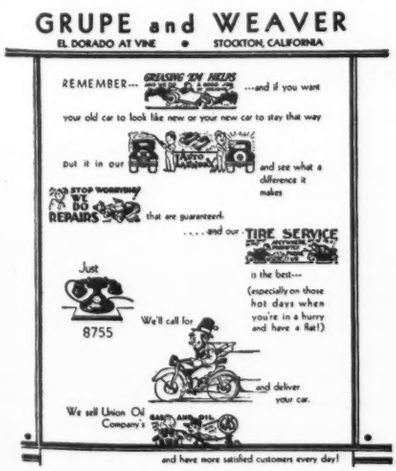
To See Ourselves As Others See Us

"GIVE five reasons for the success of the most progressive garage you know." To answer that question, Archie Kiefsky, jobber salesman, who draws his salary from New Orleans Auto Supply, scratched his head and wrote—"because its owner is always up to date in service and courtesies, keeps his garage clean, uses attractive displays and seasonal signs which call customer's attention to merchandise and service he has to offer, keeps in touch with his customers through a card index, and keeps abreast of changes in the industry by reading trade magazines."

Well, Archie ought to know—he's been in and out of a lot of garages. The judges in the recent N.S.P.A. "Question and Answer Contest" agreed with him and awarded Mr. Kiefsky one of the top prizes for his answer.

Most of the answers stressed aggressiveness, the class of workmanship turned out, quality parts, good equipment, and aggressiveness in merchandising and soliciting business.

Here we see ourselves as others see us. How do you stack up against these prize-winning descriptions of "the successful shop operator"?


GRUPE and WEAVER
EL DORADO AT VINE • STOCKTON, CALIFORNIA
REMEMBER—
...and if you want
your old car to look like new or your new car to stay that way
put it in our
and see what a difference it makes
STOP WORRYING
BE SO
REPAIRS
that are guaranteed.
....and our
TIRE SERVICE
is the best—
(especially on those hot days when you're in a hurry and have a flat)
Just
8755
We'll call for
and deliver your car.
We sell Union Oil Company's
and have more satisfied customers every day!

Grupe and Weaver use an interesting piece of humorous direct mail advertising

Advertising Clinic

Service Boosts Transient Garage Business

One of the main problems of the garage and super service station owner has been that of advertising, since he could not afford to advertise consistently enough to get any appreciable amount of transient automobile business.

A garage owner, faced with just this problem, was not long ago bemoaning the garage man's helplessness to reach this tourist business, when his words reached a group of men who decided to do something about it.

And Mo-Tel Service, Inc., was formed in November, 1936, to offer a tie-in with selected garage and service station owners, Western Union and their service to the advantage of each party. The service takes in Connecticut and Rhode Island and will eventually be national in scope, making it possible for any motorist in the United States to find competent, dependable motor service.

car breakdown?
PHONE WESTERN UNION
FOR MO-TEL SERVICE
If you have car trouble anywhere in Connecticut or Rhode Island, go to the nearest phone and ask operator for Western Union — mention Mo-tel Service. Western Union will notify the local authorized Mo-tel Service dealer or garage to serve you. You get efficient service at low standard rates. No extra cost for Mo-tel Service.
NO MEMBERSHIP FEES
MO-TEL SERVICE INC.

CAR BREAKDOWN?
PHONE
WESTERN UNION
FOR
MO-TEL SERVICE
If you have car trouble anywhere in Connecticut or Rhode Island, go to the nearest phone and ask operator or Western Union—mention Mo-tel Service. Western Union will notify the local authorized Mo-tel Service dealer or garage to serve you. You get efficient service at low standard rates. No extra cost for Mo-tel Service.
NO MEMBERSHIP FEES
MO TEL SERVICE INC.

The stranded motorist goes to the nearest telephone and calls Western Union, stating his trouble. Western Union at once calls the nearest Mo-Tel service station or garage and within five minutes assistance is on the way.

Western Union asks four questions: What is the make of your car, please? What is the nature of your car trouble? Where is the car located, please? What is the licence number, please?

Garages and service stations are selected to some extent according to the makes of cars on which they specialize so that a Chevrolet owner is connected if possible with the garage specializing in Chevrolet work.

Suggestion Box

NEAR the windows of the service office of the Badger Pontiac Co., 797 N. Jackson Street, Milwaukee, Wis., appear these words, lettered in blue: "Help Us Improve Our Service to You by Putting Your Suggestions in the Box Placed Here for That Purpose."

Practically everyone who comes into the service shop, and everyone who leaves it, sees that sign, according to Martin Lober, manager. And every week there are usually some suggestions dropped in it, some signed, some unsigned.

The suggestions, Mr. Lober says,

are very helpful. While not very great in number, nevertheless he belives the ones that are dropped in really help him and his men to improve service.

The sign implies that the company wants to improve its service, gives the customer an opportunity to speak his piece and serves to create an extra amount of good will.

Harold Cummings

Charlie Christine

Hitting Below The Fenders

That's where Harold Cummings and Charlie Christine found $27,000 last year

WORKING on "anything below the fenders" in a specialized chassis alignment shop has kept Harold Cummings and Charlie Christine, partners in the Philadelphia Auto Repair Shop, sufficiently busy to allow them to lease on concession the general repair business they started 12 years ago. The alignment shop grossed $27,000 last year and in March, 1937, it earned $2,700 which is tops for any month so far.

"We're specializing in chassis alignment because we believe we can make more money that way, and believe me, we proved that we can," is the comment of Harold Cummings, who is sales manager for this Philadelphia shop. Incidentally, Mr. Cummings worked eight years in frame straightening before he attempted to sell it and by knowing every dent, bend, wrinkle and tear in truck and passenger car chassis he's able to drag in a shopful of work regularly.

Philadelphia Auto Repair keeps busy because it has and does four things: Complete chassis alignment service; equipment to handle the biggest as well as the smallest frames; workmen especially trained in the intricacies of chassis maintenance, and aggressive advertising and selling of the shop's facilities.

Complete service is aided and abetted by large chassis aligner, believed to be the biggest of its kind in the East; two smaller units to handle passenger cars and light trucks; a static and dynamic wheel balancer; a 75-ton universal press for straightening axles, steering shafts and the like; a wheel repair machine, and complete electric and acetylene welding equipment. Alto-

(*Continued on page* 64)

BILL TOBOLDT
Editor of Motor Age

THE READERS' CLEARING HOUSE

THIS department is written by the readers of Motor Age themselves! It presents their questions, their problems together with the practical analysis of the difficulties and replies from Bill Toboldt, editor of Motor Age. Read the Clearing House—then write us! When writing please use your business letterhead or attach a business card, to indicate your connection with the automotive trade. Name and address will be withheld from publication on request.

Clutch Throwout Bearing And Brake Information

I have found many helpful suggestions in reading your "Readers Clearing House." Could you tell me what is the recommended procedure for replacing the clutch throwout bearing return spring as used on the 1934 Plymouth and 1936 Dodge?

I would also greatly appreciate some information on the brake system used on the 1936 Packard eight either 12th or 14th series. This car has Bendix mechanical brakes with vacuum booster.

I have trouble getting the brakes equalized. When they are equalized for a stop at slow speed, they will pull to the right at high speed or vice versa.

I sanded the glaze off the banding and made a major adjustment as outlined in your 1936 Chilton Brake Book but it made no change.

I find under actual operating conditions that the front wheels must be tighter than the rear to prevent the rear from sliding at higher speeds or on a steep hill which I attribute to the shifting of weight when the brakes are applied.

In checking this system, I found that the cross shaft lever for right front wheel was 1 in. longer than the rest and the left front wheel had ½ in. narrower lining than the rest.

As an experiment I drilled another hole in the lever to make it the same as the rest and cut the lining on the right front wheel to make it correspond with the other side. I then had to lengthen rear cables about 3/16 in. each after adjusting all the wheels independently with cables disconnected, to get the brakes to work evenly at high speed.

This greatly improved brake action but still at high speed it pulls to the right for just an instant and then steadily pulls to the left, if the wheel is not held.

This car has the left front spring shackle connected to the frame with

"Papers are full of this sit-down strike stuff. What's new about that?"

coil springs. Is this to minimize road shock and what effect could it have on the brakes?

Could the booster be too severe? Could one drum be more eccentric than the rest?

Now, the brakes are so sensitive that one notch either way on any of the star wheel adjustments throws the brakes off. Blaine Griffith, 425 Sioux St., Sioux City, Iowa.

WITH reference to the first part of your letter requesting information covering the installation of the clutch throwout bearing return spring on a 1934 Plymouth. It is not necessary to remove the frame cross-member to install this frame if you follow the following procedure. Disconnect the driveshaft from the universal joint and the transmission from the flywheel housing. Slide the transmission back far enough to allow you to reach in with a wrench and remove the main drive gear bearing retainer from the front of the transmission. Then, move the transmission back a little further to allow yourself more room in which to work but do not remove the bearing retainer from the clutch housing. There is room enough to reach around it with your hand and hook the new spring into the clutch release bearing sleeve. Then, the other end of the spring can be hooked to the main drive gear bearing retainer without stretching the spring enough to destroy its tension. Then, the transmission can be slid back in place so that the bearing retainer can be bolted to it and then the complete assembly pushed against the flywheel housing and bolted in position.

The difficulty with the brakes on the 1936 Packard eight is very likely caused by an eccentric brake drum. I believe if you will have the drum trued up, you will overcome your trouble without the necessity of relining the brakes.

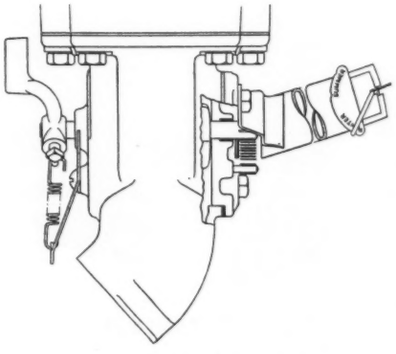
The kick-shackle on the left front spring is to help to absorb road shock that otherwise would be transmitted to the steering wheel. This should have no effect on the operation of the brakes.

Boils Solution Out Of Radiator

We have a 1935 Pontiac 8 which is giving us trouble with the alcohol boiling out through the overflow and the heat indicator shows it, as it goes right up and up till most of its 14 quarts are gone. We put in one gallon of alcohol and the rest water. So we took the radiator off, boiled it out in an acid tank. Radiator perfectly clean. New type water pump put on and took the long pipe out which goes through the block and it was in good condition. Put on all new hose. Heater is clean, block and head are clean. Put in two or three thermostats. Had thermostats open at 140. Have cover in front of radiator. Covers the bottom part, zippers up in cold weather. Motor is timed right, runs fine, starter all right, all new gaskets, head gasket too. Is it the alcohol or what or should we change to something else in that radiator. This is the cross-flow type of radiator. We would appreciate hearing from you on this matter. Harold H. Tholen, c/o Budds Auto Service, 6107 Ravenswood Ave., Chicago, Ill.

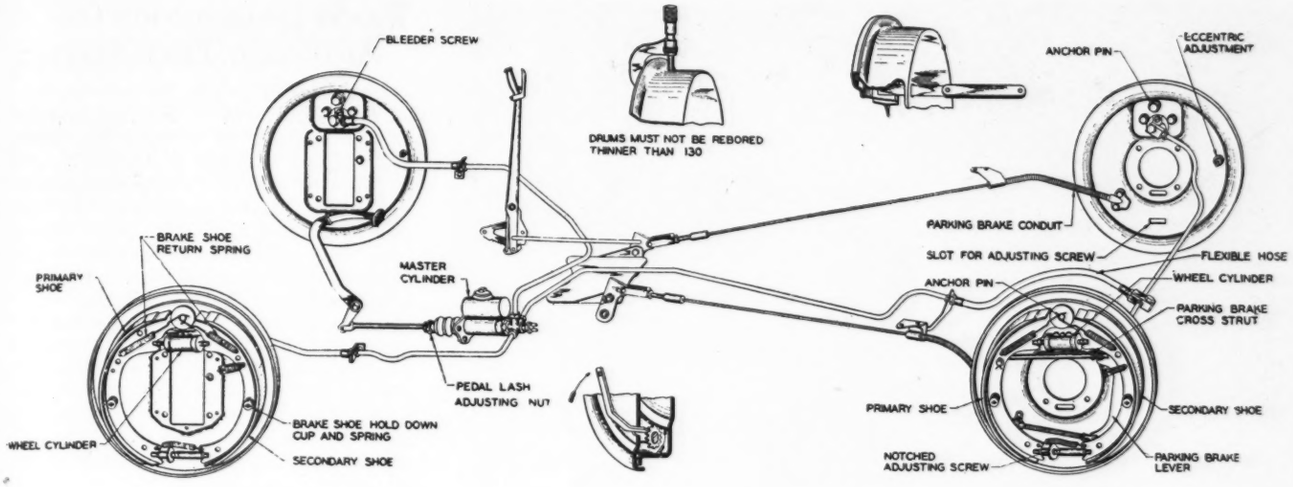
YOUR letter indicates that you have gone over this job pretty thoroughly and there does not seem to be anything left undone that could cause this condition.

There are two or three conditions which I think are worth mentioning and which may furnish a clue to the cause of this trouble. The first one is the thermostat spring that controls



the manifold heat control valve. This may be broken or may have been left out at some time when this car had a valve and carbon job performed. If this is true and the manifold heat control valve is in the closed position so that the exhaust heat is directed around the intake manifold, such a condition would cause overheating.

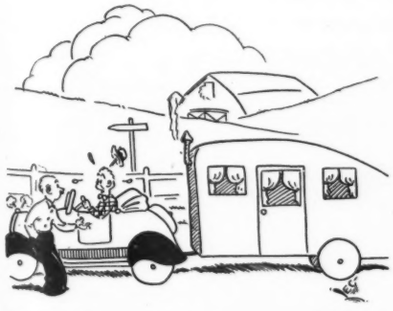
Another point is the amount of water that is put into the radiator. As you know, this type of radiator is not supposed to be filled with a cooling solution but only to a point where it



will run out the upper test cock on the side of the radiator. If the radiator is filled, the normal expansion will cause it to pass out through the overflow tube which has a tendency to set up a siphoning action and cause considerable water loss.

There is available, through authorized Pontiac dealers, a radiator condenser tank that was designed particularly for the six cylinder models. It may be that this tank could be installed on the eight cylinder models, although I have no information to that effect. I think this would be worth discussing with a Pontiac dealer as it would undoubtedly be of assistance, provided it could be installed on this model.

No doubt you would be surprised to know the number of cases in which radiators have been supposedly thoroughly cleaned and yet were not clean. When the normal causes of overheating have been carefully checked, I am always inclined to favor going back over the radiator cleaning job and checking it again to be sure that it is clean. Discussing this case with the local radiator repair shop, I am informed that this type of cross-flow radiator is remarkably free from trouble of this nature and I cannot help but feel that in your particular case, the radiator cleaning job has not been carefully done.



Hitch hiker—"And do you mind if I ride in the trailer and take a bath and a little nap while we're buzzing along"

Equalize Brakes By Adjustment

Please advise us, if possible, what you think is the trouble with brakes on a 1935 Olds six coupe. The left front brake pulls the car to the left. Drums have been changed, new factory duplicate lining, new brake washers, lines washed out, lining set with thickness gage. This was the case before it was relined also. Auto Supply Co., Eufaula, Ala.

THIS condition might be caused by grease on the lining, although in view of the fact that the brakes have just been relined, this should not be the cause. An out-of-round drum is another cause of this condition but, in view of the fact that the brake drum has been changed, this cause also should be eliminated. It is well to bear in mind, however, that just because the brake drum is new does not necessarily mean that it is perfectly round and it might be a good idea to check this drum to be sure that it is round.

The other point, and the one which I think will apply to this case, is the fact that the brake shoes are not centrally located within the drum. My suggestion is that you remove the front wheel, leaving the drum on the spindle and uncover the feeler gage hole in the brake drum. Then, use a .010 in. feeler gage and check the clearance between the heel and toe of the secondary shoe and, at the same time, turn the eccentric adjuster to try to make this clearance the same at each end of the shoe. If my guess is correct, you will be unable to do this simply by turning the eccentric adjusting screw. It will be necessary, therefore, to loosen the anchor pin lock nut and shift the anchor up by tapping it lightly with a hammer until you are able to equalize the clearance at the top and bottom of the shoe. Do not bother to check the clearance of the front shoe because it will take care of itself if the clearance is correct between the drum and lining of the rear shoe.

After you have equalized the clearance at top and bottom, then proceed with the regular brake adjustment. In case you are not familiar with the procedure for this particular car, it is to turn the eccentric adjustment screw in the direction of forward wheel rotation until there is a slight drag on the drum. Then, back it off until the drum is just free. The next step is to expand the notch adjusting wheel until you get a good drag and then back it off until the wheel is free. This should be done on all four wheels and the notch adjusting screw should be backed off the same number of notches at each wheel in order to be sure that they will be equalized.

Another condition, sometimes encountered, that causes a car to pull to one side or the other is the bolts holding the backing plate to the spindle work loose and allow the backing plate to shift during the brake application. You might check this point and be sure that these bolts are tight.

Check For Hot Spot To End "Spark Knock"

I am having difficulty with a Packard eight, Model 733, 1930, serial No. 293400—engine No. 294616. The difficulty of this particular car is that it seems to have a spark knock on a hard pull. I rebored the engine .020 over standard and put in all new rings and pistons and pins, took up all bearings and connecting rods. After about 2,000 miles run, the noise returned. I checked the distributor and automatic advance and the timing also. Cooler running plug was tried, but without any results. The oil pressure is O.K. and water temperature runs at normal. Then I took the head and pistons off to see if there was any wear and found none.

"That reminds me, darling—have you asked father yet!"

I then installed two cylinder head gaskets, reset the timing. It worked good for about 2,000 miles but as soon as it collects a small amount of carbon, the same noise and trouble comes back.

I do a lot of Packard work and this is the first one that has got the best of me. A New Jersey Subscriber.

WITH regard to the "spark knock" you are experiencing on a 1930 Packard eight, the first thing I would do would be to boil out the entire cooling system and then remove the cylinder head and scrape out the water jacket in both the head and the cylinder block. It is my opinion that you have a local hot spot somewhere that is causing your trouble. I would also check the cylinder head gasket to make sure that it is not protruding over the cylinder bore and also that there are no sharp edges on the cylinder head which might get hot and cause the spark knock.

Also check the valves. If they have been refaced until there is a sharp edge around the top of the valve, the valve should be replaced.

If these suggestions do not overcome your trouble, I would recommend a still colder running plug than the one you are using. I realize, of course, that you have already tried one type of cool running plug but possibly that was not cool enough for your particular engine.

Wants Information On Adjusting Fuel System

I am writing to you for information on the adjustment of the fuel system on two Model F-35 Oldsmobiles, with approximate mileage of 15,000.

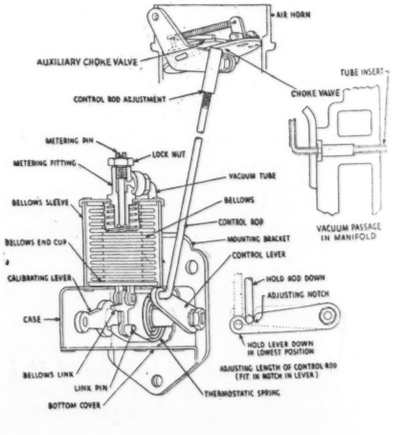
These cars have factory equipment Stromberg carburetors and Delco-Remy automatic chokes. Both start very well in both warm and cold weather, but upon even a slight pull in cold weather, for five minutes after starting, there is a roll to the motor, and a decided loss of power. These conditions can be rectified by stopping the car and gunning the motor a few times, but it is my belief that inasmuch as this was not necessary when the cars were new, that something is incorrectly adjusted.

We have adjusted the metering rod, on the vacuum choke, in each case so that the time for movement is 10-15 seconds. We have also set the length of the rod by fitting it in the adjustment notch on the automatic choke unit. If we lengthen the rod, the choke on the carburetor will not close completely. We also tried a new choke unit but without success.

On these cars, is the automatic choke supposed to close the throttle so that the idling adjustment set-screw rests on the third or slowest speed step? It does not do this, though it does drop it from the high speed step to the intermediate step. To get the slowest speed idle, we have to open the throttle and permit the weight on the fast idle unit to swing over the lowest speed step.

We shall be glad to follow any suggestions which you think indicated in the case of these two cars. T. Edward Williams, Williams Motor Co., Saranac Lake, N. Y.

THE adjustments you have made are entirely in order and there is only one suggestion that I can make and that is that you adjust the length of the control rod running from the automatic choke up to the carburetor choke valve so that it will fit in the hole of the operating lever instead of in the notch. This will have the effect of making the control rod a little



bit longer so that the choke valve will open just that much farther as the choke operating lever starts its travel. I am quite sure that this slight adjustment, even though it does not permit the choke valve to close tightly in the throat of the carburetor, will not bring about hard starting. The auxiliary choke valve, which is the little flapper valve controlled by the spring, will provide ample choking.

When the engine is hot and the throttle closed, the idle screw rests against the lowest speed step. Then, as the engine cools off, the choke has a tendency to close the choke valve in the carburetor but is prevented from doing this because of the automatic fast idle cam against which the throttle stop screw rests. As soon as the engine is started and the throttle is automatically opened, the fast idle cam drops down so that the throttle stop screw then bears against the higher step on the cam and provides a faster engine idling speed during the warm-up period. As the engine begins to warm up and the automatic choke opens completely, the fast idle cam changes its position so that the high step is moved out from under the throttle stop screw which then bears against the lower step on the normal warm engine idling position. If this fast idle cam does not drop to the low idle position of its own accord, I am inclined to believe that someone has attempted to correct this condition by oiling it. My suggestion is that you remove this cam, clean off all the oil and re-install it, after which I am sure it will operate properly. Oil is the worst enemy of the automatic choke and the automatic fast idle control and should never be used. The parts are supposed to fit loose enough to permit them to operate without the need of lubrication.

A Sure Cure For Rear Bearing Leak

I am writing you in regards to a 1929 Chevrolet that we are unable to stop the oil leak at the rear main bearing.

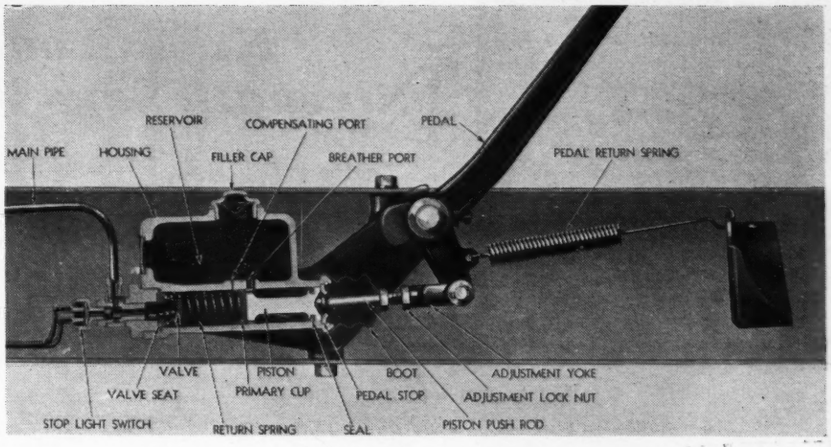
The bearing is tight and in good condition, the return hole is not stopped up and the ball check valve is not stuck.

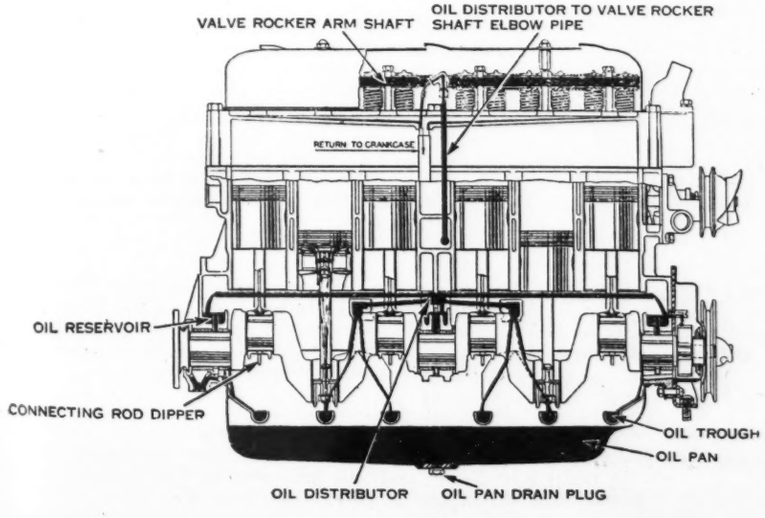
The compression is good and the motor is in extra good condition for this model and there is no blow-by to cause this.

The last time we took the pan off, we drilled a 5/16 hole through the bottom of the bearing to the oil return hole but this did not help it any.

Any help you can give us on this will certainly be appreciated. Tracy P. Loy, Loy's Garage & Machine Shop, Hitchcock, Okla.

I NOTICE that you have drilled a 5/16 inch hole through the bottom of the bearing which is one of the steps commonly taken by mechanics to correct a condition of this kind. The other points are first, to take out the ball check and leave it out. The next step is to drill through the edge of the bearing where the ball check operates, into the oil reservoir in the bearing cap, with a 5/16 inch drill. Then, on the rear end of the bearing, drill a 5/16 inch hole through the bearing cap oil groove down into the oil reservoir. By enlarging these drill passages to 5/16 inch and leaving the ball check out of the cap you should experience no further difficulty at this point.





A Few Tips On Brakes

On the 1936 Chevrolet, the brake system seems to drink air. In other words, a car for no reason at all comes in with a mushy pedal which indicates air in the lines. Bleeding the brakes is all that is necessary to put them in proper condition. Naturally, this air does not come because of low fluid level in the master cylinder as in all the cases I have checked there was a high level in the reservoir. Any time the reservoir is low, of course, that is where air comes from.

The only place air can get in is over the wheel cylinder cup edges or over the secondary cup on the master cylinder. These are the seals of the system against air and are the only places air can get in except as above referred to.

Air coming in over the wheel cylinder cups which move only 1/32 in. to 1/16 in. tops, even if brakes are poorly adjusted, is very problematic although it might occur occasionally.

The trouble develops on these cars as well as any other which uses 1 in. master cylinder cups, when the pedal is snapped back quickly. It seems that air likes to creep over the secondary cup instead of the fluid following down through the large port over the reservoir. In some of our experiments some time ago with glass cylinders, I have readily noticed this.

There are two possible remedies for this condition. One is to put a reserve tank on the system; this is usually put on the dash, thereby adding to the head of the fluid. This pressure will push a little harder against the edges of the cup and might make a tighter seal. In addition the fluid will follow faster through the post.

Another remedy is to install a spring underneath the lip of the secondary cup to add a little tension so as to keep the air out.

While I am writing this there is another thought and that is—enlarge the port which comes down from the reservoir. E. Schwarz, Eis Mfg. Co., Inc., 1365 Jerome Ave., New York, N. Y.

Know Your Merchandising Strength Says Ruark

In the final analysis service to the public is the key to profits in a business, B. W. Ruark, General Manager, Motor & Equipment Wholesalers Association, told the Independent Gasoline Dealers Association at a recent meeting in Grand Rapids, Michigan.

"The first fundamental," he continued, "for the retailer to keep in mind is the reaction of the consumer to his sales appeal. This appeal is the sum total of all the factors in your business through which you impress prospective purchasers. To the extent that favorable factors outweigh the unfavorable, you are doing a merchandising job. To the extent that the reverse is true, you are failing in your most important obligation to the public. The results are recorded in your cash register, for John Q. Public is a discerning individual and spends his money where he is best treated. That fact, so patent as to be understandable by any one, is too often overlooked."

Enlarging upon the filling stations as "a natural" in merchandising automotive maintenance supplies and service, Ruark stated retail sales volume is increasing through filling station outlets apparently at the expense of other types. The filling station operator who sets himself to do a real selling job is, therefore, "swimming with the tide" by taking advantage of a growing trend.

Continuing to drive home the importance of doing a selling job the speaker continued:

"Now is a particularly appropriate time to take inventory of the merchandising job we are doing. It is being asserted that service to the public is deteriorating since various oil companies have turned stations over to former employees because of state and national legislation or other reasons. To the extent that such assertions are truth or propaganda, we have no means of knowing.

"But we do know there is the ever present need and opportunity for improved selling. Meeting that need and opportunity is the best possible insurance for the future of your business. Dig down below surface indications. Get hold of the fundamentals in selling. What are they? To what basic stimuli does the public respond? Briefly stated, they are: Courtesy, cleanliness, convenience and service. The last, service, means giving the purchaser what he wants, when he wants it, in a way he wants it. That requires adequate stocks and good shop equipment. Too many independent

(*Continued on page* 65)

Picture Stars Introducing New Auto-Lite Spark Plugs

The new advertising campaign being launched for Auto-Lite Spark Plugs is a tie-up with motion picture stars using "Rhythm" as the theme of its program.

Joan Blondell, one of screenland's representatives of rhythm, is the first celebrity to be used and life-size cutouts of her are being placed in theater lobbies to tie in with her current motion picture.

"The King and the Chorus Girl," the Warner Bros. production in which Miss Blondell is featured, is the inaugural tie-in photoplay. The seven-color cutouts show the rhythmic Blondell "chassis" in eye-pulling proximity to the new Auto-Lite Spark Plug. "Both have Rhythm and perfect performance" reads the tie-in headline.

Willman Wins At Reading

Tony Willman was declared winner of the Hankinson inaugural race at Reading, Apr. 25. The contest was stopped at the 37th turn of the 40-lap final when Frank Beeder crashed into the fence. Beeder suffered only minor injuries, it was reported. Vern Orenduff was second and Howdy Cox, third.

Down the Column:

"Both Have Rhythm" **The new Auto-Lite spark plug is being introduced to the public with a "Parade of Stars" using the slogan, "Both Have Rhythm and Perfect Performance." Jack Benny and Mary Livingstone, radio stars, pause to observe the first blast in the campaign, a likeness of Joan Blondell, displayed in a Los Angeles theatre lobby**

"Howdy Stranger" **That's the greeting one receives from Miss Centennial, who is Dorothy Rolls of El Paso, Tex. Equipped with a pair of field glasses, Miss Centennial sits in a booth at the Al Hardy Oil Co. and when she spies an out-of-state license a block away, she greets them over a microphone**

African Derby **Danie Wege, 15-year-old schoolboy, won the South African Soap Box Derby and will take part in Chevrolet's international Soap Box finals at Akron, O., Aug. 15**

300 Mile Auto Race At Dallas Exposition

A 300-mile automobile race on Sunday, Aug. 1, will feature the Pan-American Games in conjunction with the Greater Texas & Pan-American Exposition at Dallas this summer. The event, under direction of George Preston Marshall, Washington, D. C., millionaire sportsman and president of the new Roosevelt Raceway on Long Island, will be open to European drivers as well as America's top speed aces.

Prizes totaling $17,500 will be distributed as follows: First, $7,500; second, $3,000; third, $2,000; fourth, $1,000; fifth, $750; sixth, $500; seventh, $250. The prize total includes $2,500 for fastest times made in qualifying trials and awarded as follows: Fastest qualifier, $1,000; second, $600; third, $400; fourth, $300; fifth, $200.

Sanction for the classic, to be run over a two-mile course on the exposition grounds, has been granted by the Contest Board of the American Automobile Association.

The event, one of the most important on the national speed calendar for this year, lets down the bars generally on mechanical specifications as compared with the requirements at Indianapolis on Decoration Day and at Roosevelt Raceway last year. Specifications for the two classics at Roosevelt Raceway this summer have not yet been compiled.

For the Dallas race, piston displacement has been extended to 396.65 cu. in., the largest displacement allowed in any AAA sanctioned event in many years. At Indianapolis and Roosevelt Raceway the drivers are required to hold their displacement within 366 cu. in.

Also unlike Indianapolis, the Dallas classic makes no restrictions on weight, fuel tank capacity, or type of fuel used by entrants. At Indianapolis cars must stay within a minimum weight of 1800 lb., a set 15-gal. capacity of fuel tanks and cars are restricted to commercial gasoline this year for the first time.

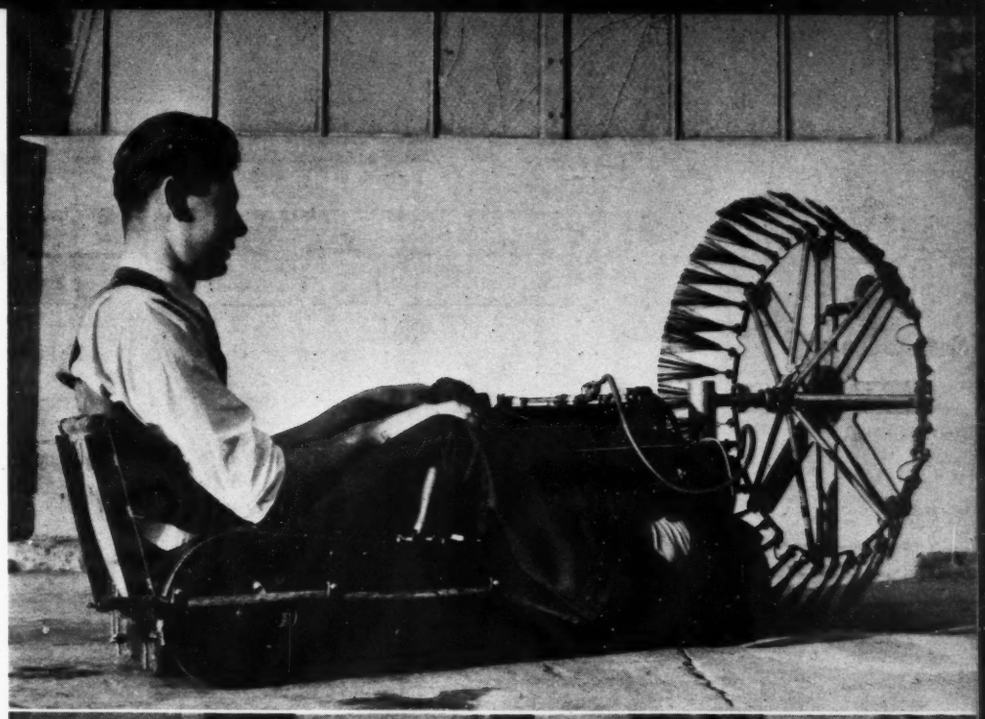
Drivers may use superchargers at Dallas. Also one or two man cars.

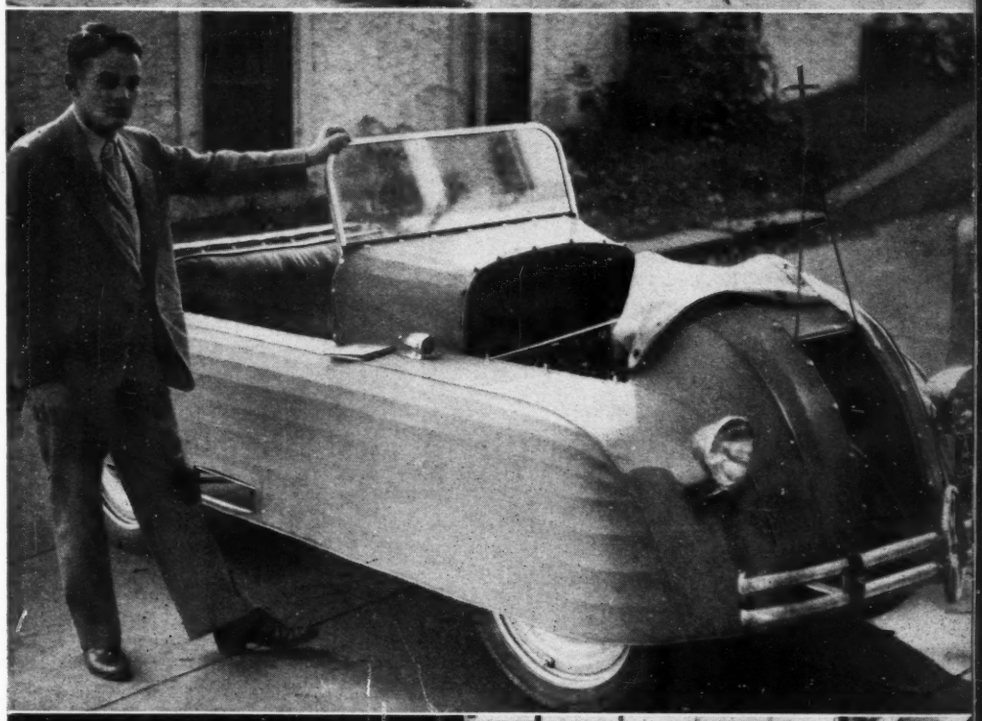
Down the Column:

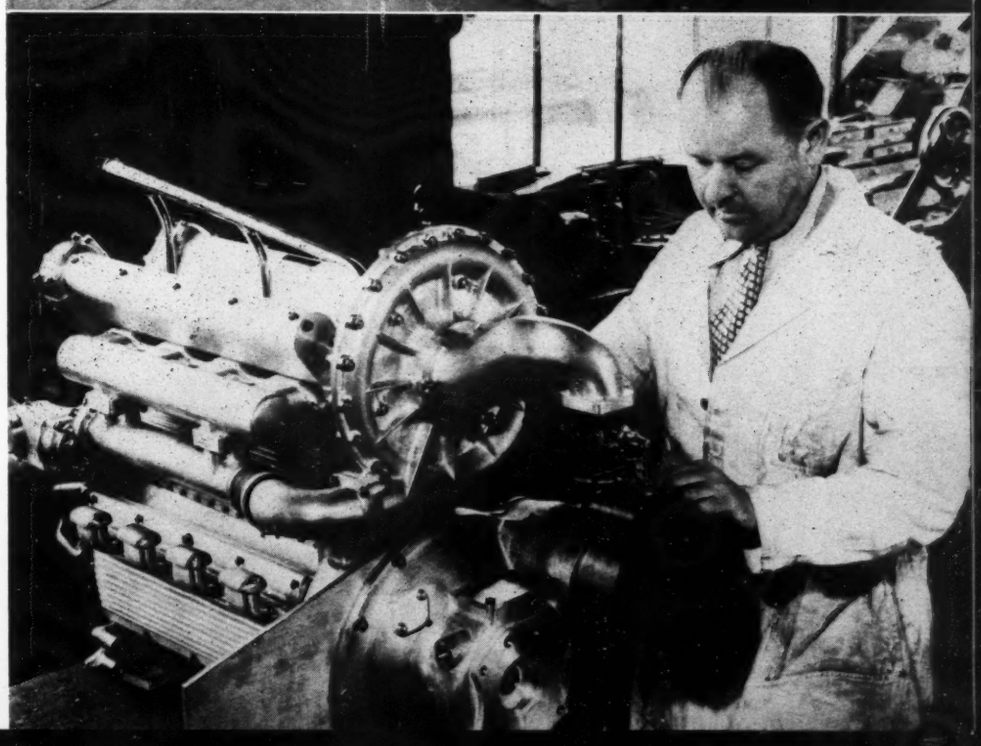
Pipe Scooter To test the inside of water mains for defective enameling this electric car has been developed. It carries an inspector through 36 inch pipes. Steel brushes electrically connected establish contact against the pipe surface. Failure of contact indicates where the enamel isn't sufficiently thick. The spot is marked and then painted

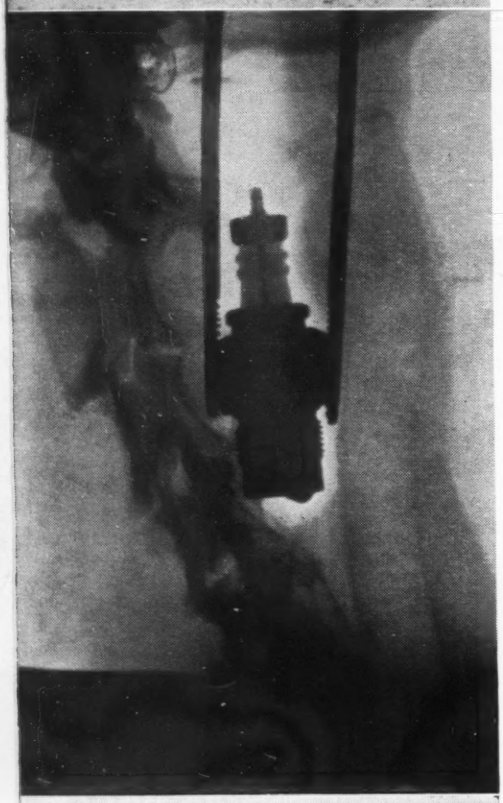
Tailored Nelson Cornelius, Minneapolis inventor, has "tailored" this streamlined auto body, using a covering of top fabric held with snap fasteners to dirigible-like steel ribs, over all

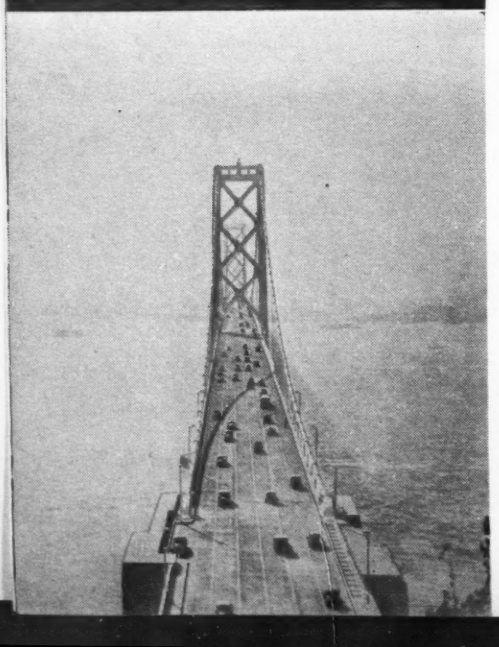
Offenhauser Fred Offenhauser, the man behind many a speedway victory, photographed at work in his shop at Los Angeles











Strike Losses Counted

Cost of Lost Wages Estimated at $42,000,000; First Quarter Car Output Set Back 437,000 Units

A rough appraisal of the loss in output as the result of strikes since the first of the year was made last month by Harold E. Gronseth in *Automotive Industries.* Not even a fair guess can be made of the amount of wages lost since an untold number of workers were laid off in plants indirectly affected, the article stated. Automobile companies which have been involved estimated that strikes cost their own workers upwards of $42,000,000. The employes of General Motors are out $30,000,000; Chrysler, $10,000,000, and Hudson, $2,000,000.

The industry's output was set back an estimated 437,000 units on the basis of the operating rate in effect before the strikes, or the tentative schedules that had been established. GM divisions were to have built 450,000 cars and trucks in January and February but actually turned out only 178,235 units, thus missing their schedules by 272,000 units. Chrysler Corp. was averaging 6100 cars and trucks daily before the strike which lost the company 24½ working days. In addition, some time was required to bring production back to the former top rate so that 150,000 units appear to be a fair estimate of Chrysler's lost output on account of the strike. Hudson had been building 600 cars a day and lost 25 working days, or a total of 15,000 cars.

In all probability some of this slack was taken up by companies left free to operate and certainly GM made up some lost time in March when its shipments jumped to 260,963 units, a volume 46 per cent in excess of the total for the first two months. The figure of 437,000 units, therefore, does not represent the amount of production the industry is behind at this time. Nor can this figure be added to the first quarter's output to indicate what might have been the results of that period were it not for the strikes. Approximately 48,000 units of the strike loss fell in the current quarter. Also GM in March ran about 35,000 units higher than its previous month's schedule which probably represented its effort to make up for the strike loss.

It seems, conservative, however, to assume that the first quarter dropped

(*Continued on page* 64)

Lee Oldfield Builds Rear-Engine Job for Indianapolis

A new design of racing car will be seen at the Indianapolis Race this year. It is the design of Lee Oldfield, an oldtimer in the racing game.

Powered by a 16-cylinder Marmon engine mounted in the rear of the streamlined body which is almost cylindrical at its midpoint, the new job is said to be capable of 200 miles per hour on a straightaway with special fuel, and it is expected that it will do 165 miles per hour on the Indianapolis track.

The car is equipped with a two-forward speed transmission with automatic shifting, independent suspension at all four wheels, and an equal distribution of weight on all four wheels so that the brake action is greater than is possible with more orthodox designs.

Construction of the new job is being financed by the young New York and Arizona sportsman, Joe Thorne.

Exides Aid Coronation Broadcast

J. F. Kelly, Jr., export manager, the Electric Storage Battery Co., Philadelphia, has reported that ten tons of Exide batteries will be used in broadcasting the coronation ceremonies from London, Eng., this month.

Down the Column:

Oooooops **Here's that game of leap frog brought up to date and motorized to a certain extent. It's all part of a rehearsal by the London Divisional Signals for the Royal Tournament to be held at Olympia, London, England, May 27**

Dog Bites Plug **With goat-like tendencies, some poor pooch figured he could improve his performance, or something, by swallowing a Champion spark plug. An X-ray was taken as forceps began removing the plug from the terrier's stomach. Both the dog and the spark plug recovered. Photo courtesy of *Dogs***

Bridge Traffic **More than 2,500,000 motor vehicles have crossed the San Francisco-Oakland Bay Bridge since it was opened to traffic last November. The bridge, more than eight miles long with approaches, is the largest bridge in the world**

Oh Careless Love

Chester Park, near Chester, Pa., is no love nest. In fact, an attorney for the School Board of Chester, annoyed at seeing romantic motorists using the park for a moonlit "playground" threatened to take their pictures and prosecute them under an 1860 Pennsylvania Blue Law. In a two-column advertisement in the local paper the lovers were warned in no uncertain terms. To follow-up the ad, a patrolman was assigned to scour the park for victims. In the silence of the night he came upon his quarry. He approached stealthily . . . then leapt into action! Only to find a couple of stuffed monkeys, in loving embrace, seated in a toy automobile.

Philadelphia Maintenance Men Open New Headquarters

The Philadelphia assembly of the Automotive Maintenance Assn. of Pennsylvania officially opened its new home at 1229-31 N. Sixth St., Philadelphia, last month. President E. Harris, presided over the business meeting at which time problems facing the trade were discussed. Nearly one hundred members attended the meeting and inspected the new home. Officers and directors of the Philadelphia assembly are: Walter E. Harris, president, Elmer Keyworth, vice-president, Robert Schumacher, secretary, Charles Haug, treasurer, Phil Watts, executive secretary. Directors: Jas. Mitchell, Les Christy, Harold Cummings, Chas. Curtis, Geo. Brunn, Chas. Gilfert, Frank Fuchs, Elwood Kieser, Walter Weigle, Harry Kreamer, James Boutilier and Dominic Fella.

Harwood Appointed

Fred R. Harwood was appointed retail production manager for Hugo Wagenseil & Associates, Dayton, Ohio, according to an announcement from that advertising agency last month.

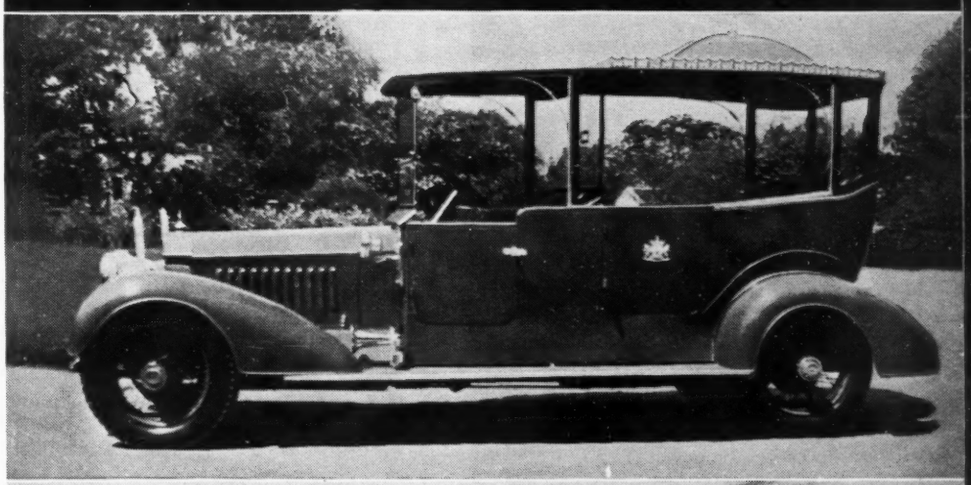
Down the Column:

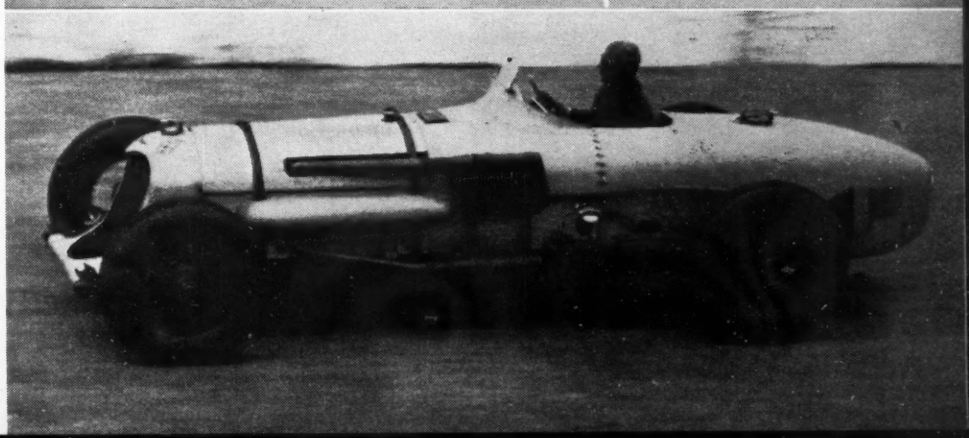
Bridge Breakdown Two specially constructed General Motors tow trucks are used on the new San Francisco-Oakland Bay Bridge

Doodlebug Display A midget racing car, displayed in the window of Grinold Auto Parts, Hartford, Conn., attracted lots of attention. There's an idea for your shop

Hyderabad Hybrid It's a 1910 Rolls Royce with modern trimmings on which the Nizam of Hyderabad, India, spent five hundred bucks to have it reconditioned for his silver jubilee celebration recently

Cobb Collects John Cobb set a new track record in winning the Broadcast Trophy Race, Brooklands, Surrey, Eng., when he averaged 136.03 m.p.h. in his Napier Railton





N. S. P. A. Launches "Good Business To Buy From Jobber" Campaign

The Marketing Research Committee of the National Standard Parts Assn. has launched a program helpful to the independent repairman built on the slogan "It's Good Business to Buy from the Jobber." Supplementing the sign "All Honest Parts are Genuine" which is on display in jobber establishments throughout the country and which tells the story of quality merchandise, a second sign will be featured on the jobber's service to his customers. This sign, which is also reproduced in the form of catalog pages and small display signs for shops, is entitled, "It's Good Business to Buy from the Jobber."

The text reads, "He acts as my buyer, offering me carefully selected, nationally known quality merchandise, backed by the manufacturers' guarantee and his own.

"One source of supply saves me time and money. My mechanics make money for me out in my shop—not out shopping.

"He gives me prompt delivery, intelligent phone and counter service on whatever I need, whenever I need it.

"His specialized mechanical department helps me get more jobs and make more money.

"He extends credit courtesies and makes reasonable adjustments quickly.

"He and his salesmen give me sales and merchandising ideas that help me get more business."

Duce's Son Quits Race

Dispatches from Rome, Italy, last month told of the entry and forced withdrawal of Vittorio Mussolini, Il Duce's eldest son, in the 1000-mile auto race from Brescia to Rome. Young Mussolini, the dispatches said, got as far as Modena, about 70 miles from the start when his car developed engine trouble and forced him to quit.

Coming Events

SHOWS

Second Annual Automobile Maintenance Show, San Francisco..May 20-23
National Automobile Show, New York, Oct. 27-Nov. 3
Buffalo, N. Y., Auto Show..Oct. 30-Nov. 6
Cincinnati Auto Show .....Oct. 31-Nov. 6
Chicago Auto Show .....Nov. 6-13
Omaha, Neb., Auto Show.....Nov. 6-11
Akron Auto Show .....Nov. 6-12
Motor Truck Show, Newark, N. J., Nov. 6-12
Brooklyn Auto Show .....Nov. 6-13
Columbus Auto Show .....Nov. 6-13
Detroit Auto Show .....Nov. 6-13
Kansas City, Mo., Auto Show..Nov. 6-13
Newark, N. J., Auto Show.....Nov. 6-13
Philadelphia Auto Show .....Nov. 6-13
Pittsburgh, Pa., Auto Show ....Nov. 6-13
Toronto, Ont., Auto Show.....Nov. 6-13
Baltimore, Md., Auto Show....Nov. 13-20
Cleveland, Ohio, Auto Show....Nov. 13-20
Jersey City, N. J., Auto Show..Nov. 13-20
Milwaukee, Wis., Auto Show...Nov. 13-20
Springfield, Mass., Auto Show..Nov. 14-20
St. Louis, Mo., Auto Show.....Nov. 14-21

CONVENTIONS

National Battery Manufacturers Asso., Spring Convention, Shoreham Hotel, Washington, D. C....May 13-14
American Petroleum Institute, Mid-Year Meeting, Colorado Springs, Colo .....June 1-3
Automotive Engine Rebuilders Association, 15th Annual Convention, Chicago .....June 21-24

INTERNATIONAL RACES

Indianapolis Speedway, 500-Mile International Sweepstakes .....May 31
31st Annual Grand Prix of the Automobile Club of France, Linas-Montlhéry .....July 4
Roosevelt Raceway, 400-Mile George Vanderbilt Cup Sweepstakes....July 5
Greater Texas & Pan American Exposition, 300-mile Race .....Aug. 1
National and International Soap Box Derby Finals, Akron, Ohio....Aug. 15
Pan American Cup Race, Roosevelt Raceway .....Sept. 6
National Outboard Championship Regattas, Richmond, Va.....Sept. 18-19
Los Angeles, 500-Mile International Sweepstakes .....Nov. 28

Down the Column:

What's in a name The picture atop the page has us wondering whether Mr. Born owns the business or whether the company is simply advertising its natural aptitude. Anyway, Born Auto Wreckers will do a first class job, regardless

An Awful Bust An auto that was an awful bust anyhow, was blown to bits by the A. A. A. in an undeveloped section of Rock Creek Park, Washington, D. C. The auto club bought the wreck and put on the demonstration to prove that the capital city needs a used car inspection law

Put 'er in a pumpkin shell The two lower photos show "Big Benny," the mechanical car crusher in action. It is used in a Buffalo, N. Y., junk yard to reduce steel bodies and other metal parts of autos, tractors and trucks into compact, solid masses for delivery to a smelting furnace. Bottom picture shows how an automobile body looks after "Big Benny" gets finished. You could put 'er in a pumpkin shell

"I Signed My Pontiac Franchise a Few Days Ago."

"I signed my Pontiac franchise a few days ago and I am still receiving the congratulations of my friends. It is certainly fine to be connected with a product as well thought of as Pontiac. I gave due consideration to several other makes before signing up but none offered as good an all-around opportunity. Pontiac has the best franchise in the industry from every standpoint. I'm certainly delighted to be one of the men to profit with Pontiac."

M. E. LONG, *General Manager*
Fort Pontiac Company, Detroit, Michigan

This recently received letter sums up the opinion of the thousands of able business men who make Pontiac's dealer organization one of the most successful and best regarded in the automobile industry. A few of the reasons why the Pontiac franchise naturally attracts aggressive, ambitious men are given below. Read them carefully if you are interested in an opportunity to grow and profit with a progressive organization.

1 LARGER SLIDING SCALE DISCOUNTS—Pontiac dealers agree that Pontiac offers the fairest of all discount policies—whereby profits per car increase as more cars are sold, up to a reasonable limit.

2 "LIVE AND LET LIVE" POLICIES—The first consideration of Pontiac is that dealers should make money because Pontiac knows that a satisfied, prosperous dealer organization is the best guarantee of success. All Pontiac policies are aimed at this result.

3 THE "HOT LINE" FOR 1937—Pontiac dealers offer buyers in the low-priced field, where 90% of all sales are made, a bigger, more beautiful six with authentic fine-car features and an eight that measures up to the finest cars built, yet is the lowest-priced eight in General Motors.

4 PROTECTED TERRITORY—Pontiac grants franchises only in territories with a sufficient potential to provide a real opportunity for profit. And dealers are given exclusive selling rights within certain, well-defined areas.

5 GENERAL MOTORS BACKING—Along with the prestige and public acceptance that comes with a General Motors franchise, Pontiac dealers have available the facilities of the world's largest financing organization.

6 RECORD DEALER PROFITS—As contrasted to 1934, dealer profits increased 398% in 1935. Profits for 1936 increased 45% over those of 1935. The total increase from the beginning of 1934 to the end of 1936 was 620%. Sales and profits for 1937 already indicate another big increase. Pontiac is a *growing* organization.

"Everything points to the Pontiac Franchise as **THE BEST BET OF THE YEAR"**

If you are interested in acquiring the Pontiac franchise, please communicate with C. P. Simpson, General Sales Manager, Pontiac Motor Division, General Motors Sales Corporation, Pontiac, Michigan. Your communication will be regarded as strictly confidential.

Prices of Tire Repair Materials Advanced

Practically all tire manufacturers and producers of tire repair and retread materials have advanced prices on repair materials and "camelback," the principal retreading material. The move carries "camelback" to its highest price in history—25 cents a pound on ton lots, and has been a signal for retreaders throughout the country to advance prices on retread and recap jobs and on tire repair work.

Crude rubber prices have softened considerably and have recessed nearly three cents a pound from the peak of 27¼ cents earlier in April. The drop in crude costs has removed, temporarily at least it is believed, any possibility of further tire price increases before mid-summer.

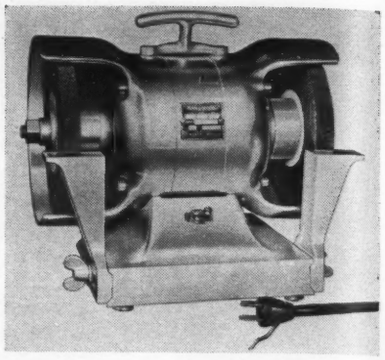
New International Rings

The International Piston Ring Co., of 2401 W. Superior Ave., Cleveland, Ohio, announces the production of new Super-Scraper and Super-Chief sets

of piston rings. The manufacturer claims that the new Super-compression ring, is not only a compression ring, but also that it helps the oil ring control oil consumption far better than any ring heretofore manufactured by the International Piston Ring Company. The Super-Compression Chief ring is produced with a minute taper which coincides with the advanced trend in piston ring design.

Black & Decker Offers New Bench Grinder

A new Junior Bench Grinder has been announced by the Black & Decker Mfg. Co., Towson, Md. Powered by a standard constant speed motor of ¼ h.p. rating, and supplied for all standard A.C. single-phase voltages and cycles, the new grinder is equipped with one fine and one medium wheel, 6 in. diameter by ⅝ in. face. Generous size wheel guards cast integral with motor housings for greater clearance, providing ample room for use of wire wheel brushes. Total net weight 31½ lbs., and the grinder is equipped with a convenient carrying handle and 4 rubber feet so it is adaptable to instant use at any convenient spot. It may also be bolted to the bench. Offered at new low price of $19.95.



Vulcan Air Cleaner Service Unit

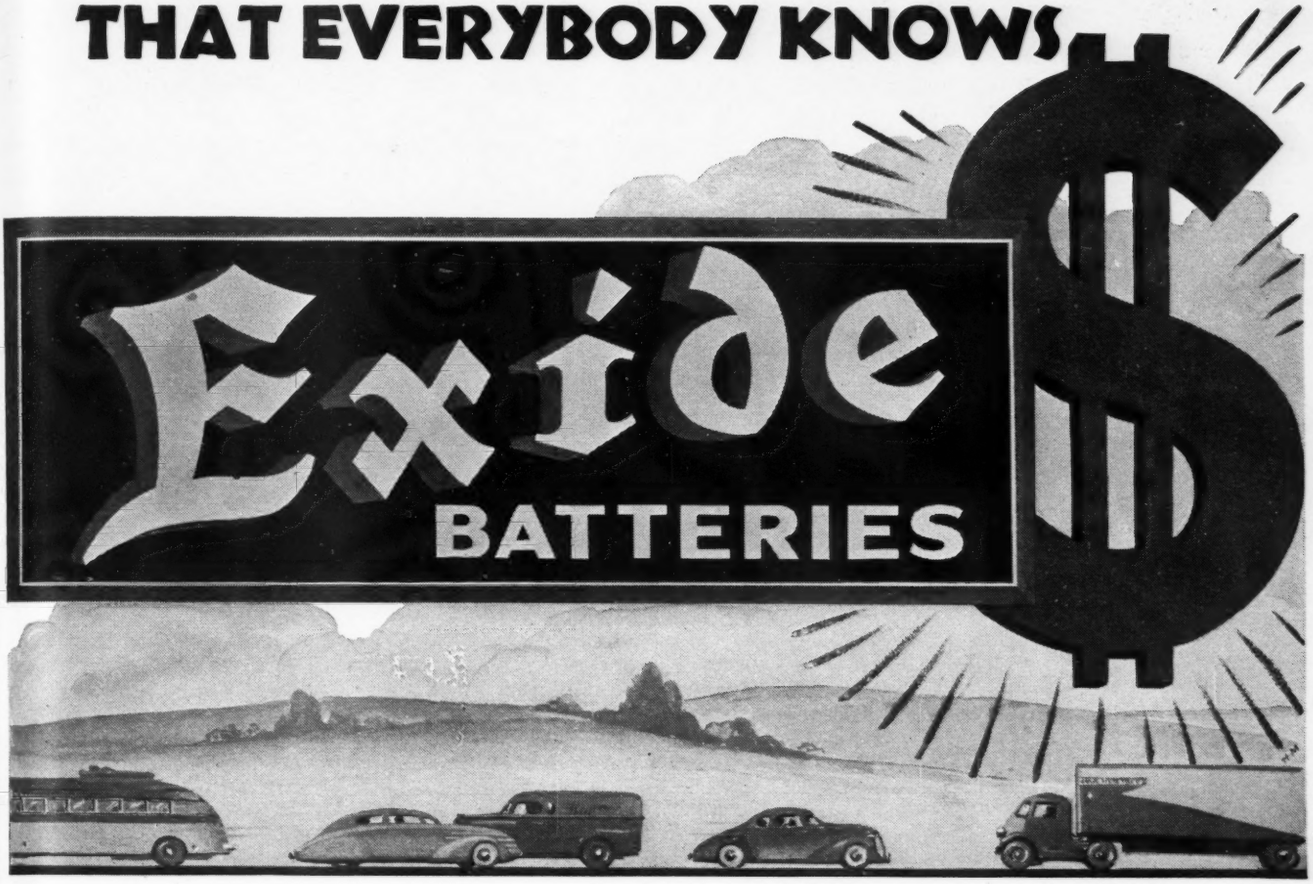
A new unit for servicing air cleaners has been announced by the Vulcan Mfg. Co., Inc., Wabasha & Channel Sts., St. Paul, Minn. The air cleaner is placed inside the Unit, which is connected to the regular air line. A stream of gasoline is forced through the air cleaner, washing out the accumulation of dirt and dust. Air pressure then dries the cleaner, after which a fine mist of oil is forced into the cleaner. Entire cleaning operation takes place within the unit. Dealer's net price $18.75.

— but Nowhere to Parkyakarkus When the good fathers in the various cities adopted the new fangled and highly profitable parking machines they found themselves with a problem or two.

The lady at the top is seen parking the right way. She inserts her nickel in the automatic parker for which she is allowed freedom of the space for fifteen minutes. When time's up a little flag pops up—and so does John Law.

But the citizenry of Knoxville, Tenn., couldn't figure the thing out exactly and to be on the safe side, father drops in his nickel and plants the perambulator along the curb—and to further complicate matters, another gentleman drove up and hitched his mule to what he must have figured was an old fashioned hitching-post

TWO SIGNS AND TWO SYMBOLS THAT EVERYBODY KNOWS

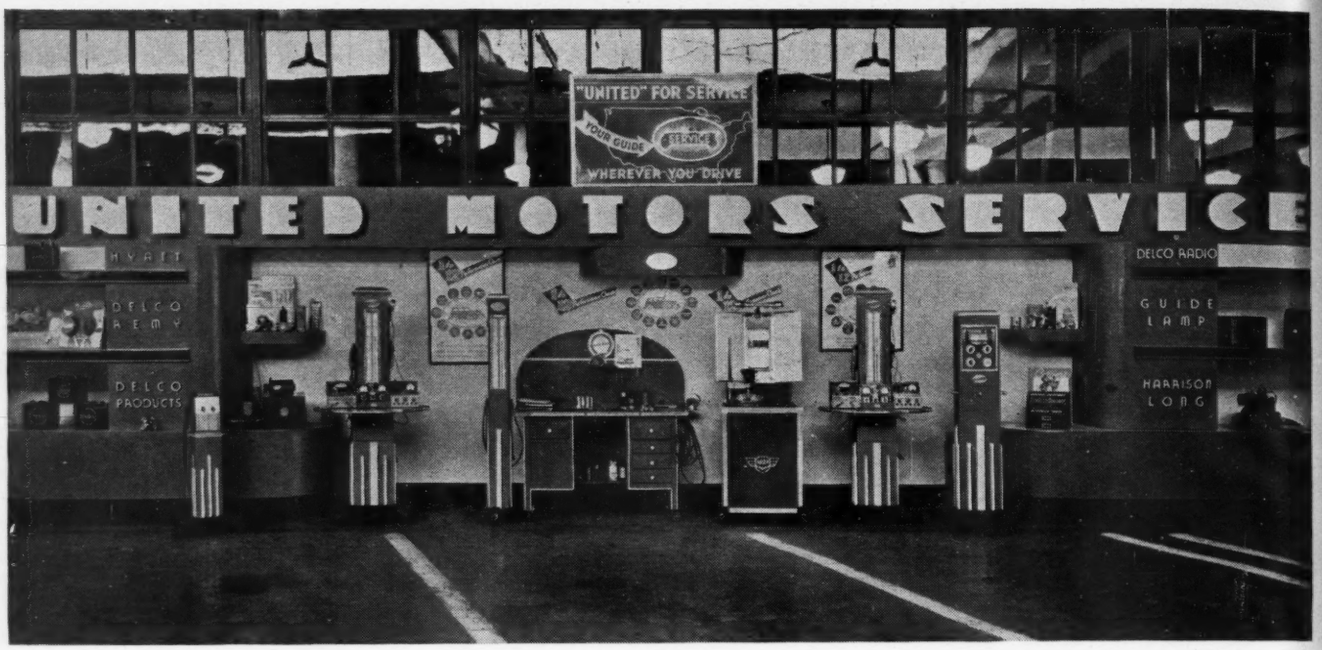


LIKE the dollar sign, the Exide sign is a symbol . . . it stands for a product known and respected by motorists everywhere. It stands for a substantial and profitable business for the dealer, based on the most progressive battery merchandising program ever placed in the hands of the automotive trade.

This sign on your place of business ties your name to the most powerful name in batteries . . . puts you in a position to cash in on the Exide reputation for quality built up by 50 years of continuous advertising, plus the actual experience of millions of satisfied users.

The Exide Dealers and the makers of Exide Batteries have joined together to make the Exide sign a symbol of dealer success. Here is an identification sign for your business that means cash profit to you. Get in touch with your Exide Wholesaler now, or write to us.

THE ELECTRIC STORAGE BATTERY CO., Philadelphia
The World's Largest Manufacturers of Storage Batteries for Every Purpose
Exide Batteries of Canada, Limited, Toronto



WAKE up spring business is the keynote at United Motors Service in Philadelphia. This photo shows how departments are being dressed up to increase shop efficiency and to attract trade

Day by Day *with* Mark Graves

The daily diary of an independent service station operator

He Forgot

It's sixteen miles to the country club. Beautiful drive along the country road but it wasn't quite so interesting last night. At 3 a. m. the telephone rang. One of my very best customers could not get his car started; so naturally one of the prices I pay for business was to get up and go get him started. When I got there the car was O. K., just too much of the cup that cheers. He forgot to turn on the switch.

Banana Broker's Tip

Bananas mean business. Delivered a car to a commercial broker today. While waiting for the check I heard him 'phone many of his accounts, telling them of the arrival of a carload of bananas. He sold them all over the 'phone. I am busy now going over my file and calling all the old customers. I am re-selling a "bunch" of them.

Black Cat

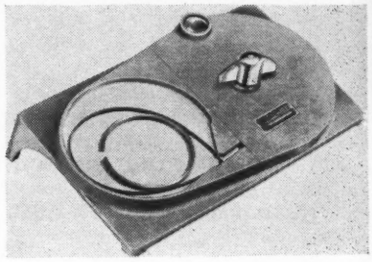
We had a salesman who never believed that black cats are bad luck. He knows better now. When the colored washer finished washing the salesman's car he took a nap in the back seat. The salesman saw him about the time he saw a black cat. So he tossed the cat in with the washer. The washer jumped up scared and in the excitement put his foot through the glass window of the car. The salesman is learning.

Show Must Go On

It was hard to keep the show going today. When customers drove in I had to be all smiles and attention. Little did they know that this a. m. I was up before daylight, tried to make an appetizing tidbit for my wife and daughter who are ill and cannot leave their bed. Then off to the garage at the usual time with a cheery "Good morning." All the actors are not in Hollywood.

Ring Diameter Gage

A new gage for measuring the true diameters of all sizes of piston rings has been developed by The Wilkening Mfg. Co., 2000 South 71st St.,

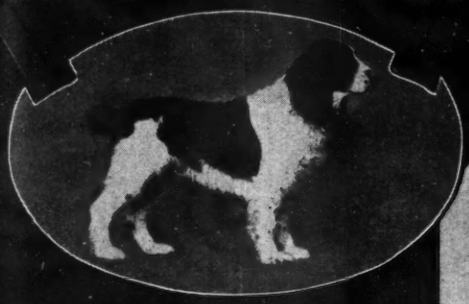


Philadelphia, Pa. The illustration shows how the ring gage draws each ring against an angle which automatically maintains the same center line for all rings. Readings are made on a dial through a powerful magnifying glass in fractions. Undersizes and oversizes in tens of thousands also are indicated. It will accommodate all rings from 2 in. to 6 $\frac{5}{16}$ in. diameter, covering the entire automotive field as well as most of the larger truck and tractor sizes.

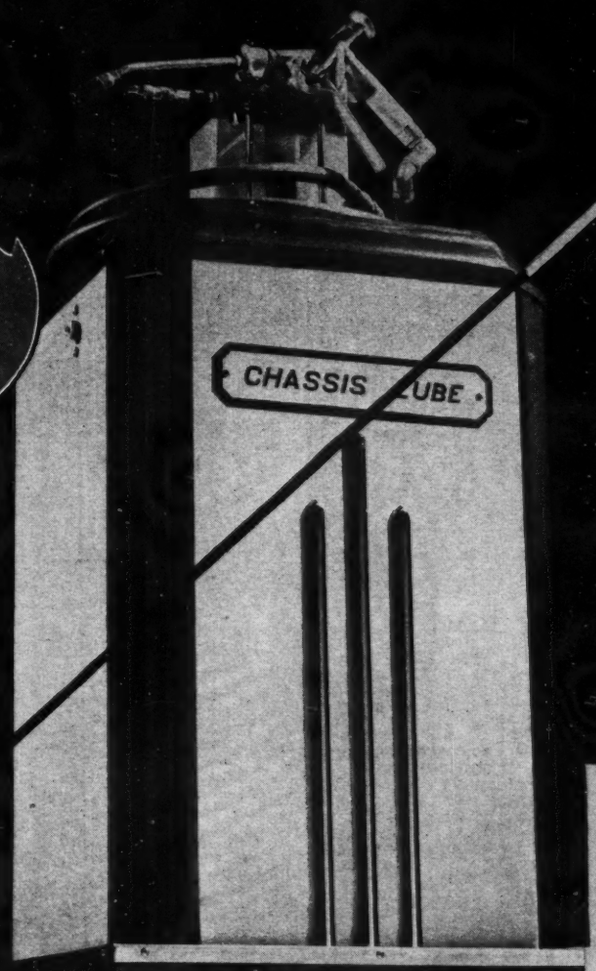
M.E.W.A. Sets Convention Dates

The 1937 Annual Convention of Motor and Equipment Wholesalers Association will be held, according to announcement made at headquarters of the Association in Chicago, at the Stevens Hotel, Chicago, just in advance of the Automotive Service Industries Show which opens at the Navy Pier, December 6, dates of the Convention very likely being December 3 and 4.

DONT BUY BEFORE YOU TRY



Champion Marol Masquerader
owner Lou Bacher
North Olmsted, Ohio

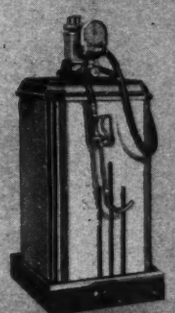


★ CHANGING GREASE DRUMS

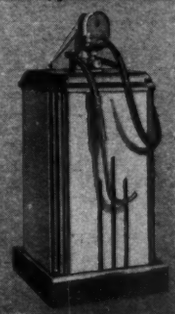
With ordinary *Original Container Lubricators* it's a two-man job and a very dirty, laborious two-man job at that, to change grease drums. You have to lift drum completely up, over and into cabinet besides laying gun, hose and pump on the floor or up against unit where it smears or gets dirty.

All U. S. Lubricators have the famous patented *Jack-in-the-box covers* which make it "child's play" changing grease drums. Simply move latch on the outside of container and up pops the complete cover including pump, hose and gun—entirely out of the way and remains in this elevated, stationary position until released. Step right up and open the wide front panel, which is a hinged door, slide in a full drum of grease and that's all there is to it, it's an easy simple operation.

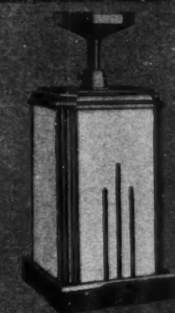
Clean as a whistle in looks as well as in operation.
Finished in beautiful Golden Yellow and Royal Blue.



U. S. MODEL GC-400 portable "power operated" gear lube dispenser with an exclusive, patented air eliminator.



U. S. Model GC-400 is a portable hand operated gear lube dispenser with the exclusive, patented air eliminator.



GC-700 PORTABLE [illegible] with a heavy, extreme pressure lubricant, which can be obtained in any locality.

U S AIR COMPRESSOR COMPANY ··· CLEVELAND, OHIO

AIR COMPRESSORS • AIR TOWERS • HYDRAULIC LIFTS
GREASING EQUIPMENT • CAR WASHING SYSTEMS

Flat Rate Prices On 1937 Oldsmobile

Model L-37—8 Cylinder—1937

Starting Serial Number { CL-140,001 / L-146,001

3¼ in. bore x 3⅜ in. stroke. Piston Dis. 257.1 cu. in. A.M.A. Hp. 33.8

OPR.	LAB.	MAT.	MFR HR.
A			
5	$8.50	$3.60	4.8
6	2.25	3.00	N.O.
7	R 10.75	15.00	N.O.
7x	3.50	6.80	2.1
7y	2.15	1.65	1.7
8	5.50	....	N.O.
8x	3.00	....	N.O.
A8Y	8.00	....	2.0
9	R 3.50	11.40	1.6
9x	1.25	....	.5
10	1.00	.40	.4
11	5.50	....	2.5
12	3.75	....	1.8
13	1.35	....	1.0
14	8.75	S.L.	3.5
15	2.00	.70	N.O.
16	1.50	S.L.	.5
20	2.75	11.55	N.O.
21	3.00	6.75	1.8
24	2.00	S.L.	1.0
B			
1	1.50	1.70	.4
1x	.80	.40	.3
3	1.50	....	.7
4	2.50	.20	1.7
6	.90	....	N.O.
8	3.50	1.00	2.4
8c	1.35	2.50	N.O.
8f	4.25	3.90	1.9
10	4.25	3.50	1.9
13	7.25	7.40	3.8
13a	1.25	6.80	1.2
13y	25.45	....	N.O.
14	1.50	.40	N.O.
15	R 1.50	5.20	N.O.
16	1.00	....	N.O.
17x	1.25	1.00	.8
18	2.50	.70	R 1.3
18x	1.00	....	N.O.
18y	1.90	....	N.O.
19	3.10	.60	R .8
19a	2.70	.60	N.O.
19b	1.45	....	N.O.
20	1.55	....	N.O.
20a	1.10	....	N.O.
21	15.70	4.10	N.O.
21a	12.20	4.10	N.O.
22	1.00	1.00	.7
C			
2	4.00	47.85	1.6
3x	4.25	18.35	1.8
4x	.75	1.25	.4
5	.50	....	.3
6	.50	....	.3

OPR.	LAB.	MAT.	MFR HR.
C—contd.			
7x	.75	....	.4
8	.40	1.15	N.O.
10x	1.75	1.00	.9
11	2.50	.15	1.3
12	3.75	S.L.	2.0
D			
2x	2.00	.30	1.4
3	3.00	.60	1.3
4	1.00	.15	.7
5	3.00	.60	1.3
6	.75	.15	.5
7	2.50	.40	N.O.
7x	4.00	....	1.6
7y	3.00	7.20	1.5
8y	2.00	....	1.2
9	3.75	....	2.0
10	1.25	....	.6
11	.85	.05	1.1
11x	R 3.00	....	1.5
12	2.00	3.95	1.0
13	1.75	3.85	.8
15	3.00	10.50	1.5
16	1.95	1.75	1.0
E			
1	103.00	S.L.	R 44.0
1a	4.00	....	N.O.
2	59.00	S.L.	18.1
3x	32.00	29.40	12.3
4	29.65	14.20	N.O.
5	28.00	25.40	9.0
F			
1	17.00	1.00	N.O.
3	65.00	R 156.90	27.0
H5	9.50	3.60	N.O.
5	11.60	3.60	N.O.
5x	13.60	3.90	N.O.
5y	20.35	4.45	N.O.
6	5.00	.40	2.4
9	2.25	.40	N.O.
10	3.50	1.10	1.5
13	2.00	2.50	1.1
15	1.90	S.L.	1.0
15a	1.90	S.L.	.5
17a	8.50	....	....
18	2.00	.30	N.O.
19	.50	.10	.2
G			
2	2.40	15.20	N.O.
2a	.30	1.90	N.O.
3	13.90	18.80	R 4.4
5	15.50	7.60	5.0
6	17.90	22.80	N.O.
7	.50	.50	.4
9	4.00	4.00	2.4

OPR.	LAB.	MAT.	MFR HR.
G—contd.			
11	10.30	10.20	5.0
13	3.80	6.60	1.1
14	35.90	56.40	12.3
H			
1	9.50	3.60	N.O.
1x	6.00	3.60	N.O.
1a	2.50	2.50	N.O.
1b	4.00	1.10	N.O.
2	2.00	....	.7
2a	.25	....	N.O.
5	2.45	3.20	1.6
5x	.45	.70	N.O.
6	2.00	5.60	.7
K			
1	6.50	6.60	N.O.
3	10.00	12.20	N.O.
5	2.00	12.20	N.O.
6	8.50	9.10	4.0
8	R 29.00	67.85	R 15.6
9	11.00	.95	N.O.
10	3.00	.40	N.O.
11	5.25	.35	N.O.
L			
1	16.65	2.00	6.8
1a	14.15	.90	5.9
2	13.40	2.00	N.O.
3	7.20	4.00	1.6
4	.60	.25	.2
6	3.25	.20	1.4
7	4.35	1.45	1.9
7a	.40	1.5	N.O.
8	1.60	1.95	1.9
9a	31.00	13.15	N.O.
11	.90	.20	.5
M			
1	6.75	.55	3.0
3	8.85	.65	N.O.
4	8.25	4.90	3.5
4a	1.50	4.35	N.O.
4b	2.25	4.55	N.O.
5	2.25	8.10	N.O.
7	10.75	3.85	3.0
8	12.00	....	N.O.
O			
1	.50	....	N.O.
3	7.00	7.85	2.0
4	6.00	1.75	2.5
5	7.30	....	N.O.
6	.30	....	.5
7	.60	1.75	.1
8	9.30	S.L.	3.6

OPR.	LAB.	MAT.	MFR HR.
O—contd.			
9	8.15	S.L.	N.O.
11	8.25	8.10	4.5
12	1.25	7.75	.9
13	1.25	2.00	.9
14	9.50	2.35	N.O.
15	10.25	10.85	6.0
16	2.00	....	.8
18	2.25	....	1.2
19	4.15	....	2.0
P			
1	4.75	.25	2.4
1x	8.50	.90	N.O.
2	2.25	.65	1.0
3	10.00	S.L.	3.9
4	2.75	S.L.	N.O.
5	9.00	10.65	N.O.
6	5.25	S.L.	1.5
7	2.50	4.40	N.O.
Q			
1	2.25	S.L.	1.0
2	2.00	S.L.	1.0
3	3.00	S.L.	.7
4	2.25	S.L.	N.O.
5	.75	....	N.O.
R			
1	6.00	1.35	N.O.
2	11.00	22.60	4.3
3	5.00	.80	N.O.
4	2.25	8.00	1.0
4b	R 5.50	9.30	1.8
5	11.00	S.L.	4.2
6	5.00	3.05	2.2
6a	R 3.75	6.00	N.O.
6x	8.00	3.05	N.O.
8	5.00	15.40	N.O.
9	10.00	18.45	N.O.
10	2.25	.30	1.0
11	R 1.75	1.00	N.O.
S			
1	.50	....	N.O.
6	1.80	.15	.5
7	2.25	5.20	1.0
8	2.70	10.20	1.0
8x	3.25	S.L.	N.O.
9	2.75	....	1.2
10	1.50	....	R 1.2
12	.75	....	.3
U			
1	.40	....	N.O.
2	1.00	.70	N.O.
3	1.10	....	N.O.
3x	.60	....	.6

OPR.	LAB.	MAT.	MFR HR.
U—contd.			
4	1.50	....	1.0
6	.40	....	N.O.
6x	1.00	3.00	.7
7	2.00	....	N.O.
7a	1.80	S.L.	.8
7x	.60	.35	.6
9	2.10	.50	1.4
10	2.80	.40	1.7
11	3.10	4.50	N.O.
12	1.30	....	.8
12a	3.00	2.50	1.5
12b	1.25	1.50	N.O.
13	2.00	....	1.0
13a	3.20	S.L.	1.4
13b	1.50	3.00	N.O.
14	3.20	5.40	N.O.
15y	3.20	3.50	N.O.
16	1.50	.75	.9
17	1.40	1.25	.7
17a	.85	.60	.5
17x	1.10	1.00	.6
18	R 3.50	....	R 1.8
19	.75	....	.6
20	.50	.35	.3
21	.75	1.80	.6
22	.90	3.50	.2
22x	2.00	....	N.O.
23	1.00	....	.5
24	.85	1.35	.5
25	1.00	....	.3
V			
1	4.00	20.75	1.8
2	4.75	....	2.5
3	2.50	11.00	1.0
5	2.00	7.50	.7
8	1.00	1.10	N.O.
W			
2	.30	.10	N.O.
2x	.25	....	....
3	1.25	....	.5
4	1.80	5.70	.7
4x	2.25	7.65	1.9
5	1.00	.50	.5
6	.25	....	N.O.
7	.75	9.75	N.O.
X			
1	1.25	....	.5
2	20.00	....	6.0
4	2.00	....	.6
5	3.00	....	1.5
6x	1.75	....	N.O.
9	2.00	....	.8
10	62.00	R 85.00	30.0

N.O. = No Factory Operation.

Factory Hours from Oldsmobile Flat Rate Manual 1937

R IMPORTANT—Read below before quoting prices

R A7, 9—Applies to new tie rod end assemblies.

R B15—Applies to front drum only.

R D11x—Priced for combination pump, fuel pump only, $1.85.

R F3—Applies to block fitted with pistons, pins and rings.

R K8—Done from below by R&R timing chain, transmission and fly wheels.

R R4B—Applies to axles with bolted on covers.

R R6A—Priced for rear axles with bolted on covers; if axle has welded on cover, $6.75.

R R11—Cannot be done on axles with welded on covers.

R U18—Priced for headlamp wiring harness.

R X10—Applies to convertible coupe frame.

MANUFACTURER HOURS

R B18, 19—Includes bleeding.

R E1—Includes overhaul clutch.

R G3—Alignment of rods not included.

R K8—Applies to renewal of crankshaft only.

R S10—Includes R&R both rear shock absorbers.

TUNE-UP AND REPAIR DATA

Main Bearings: Steel backed, babbitt lined. Renewable from below.

Rod Bearings: Steel backed, babbitt lined removable shells.

Rod and piston assemblies are removed from above.

Tappet Clearance: Inlet .008 in. Exh. .011 in. hot.

Valve Timing: With inlet tappet set to .012½ in. valve opens at T.C. With exhaust tappet set to .015½ in. Exh. closes 10 deg., or 4 flywheel teeth after T.C. Marks on cam and crankshaft sprockets should be nearest each other and on line between shaft centers.

Ignition Timing: Full automatic advance. Spark for No. 6 cylinder occurs 2 deg. before T.C., or when the steel ball in flywheel face lines up with pointer.

Timing Hole Location: Left side of flywheel housing, between starter and block.

Seat Angle of Valves: Inlet 30 degrees, exhaust 45 degrees.

Car Serial Number Located: Left frame side member, under hood.

Interrupter Point Gap: .015 in.

Spark Plugs: Std. AC K-9. Colder K7, Warmer K10. Set to .030 in.

Firing Order: 1, 6, 2, 5, 8, 3, 7, 4.

Number of Flywheel Teeth: 145.

Brake, Make, and Drum Diam.: Bendix Hydraulic, 12 in.

Brake Lining Total Length: Front: 3 ft. 10⅛ in. x 1¾ in. x 3/16 in. **Rear:** same. **Hand:** uses rear service shoes.

Oil Capacity Crankcase in Qts.: 7. Winter 10W, Summer SAE 30.

Transmission Oil, Lbs. or Pts.: 2.

Differential Oil, Lbs. or Pts.: 2½.

Cooling System Capacity: 20 qts.

Oil Pressure: 27 lbs. Adjustment located in oil pump.

Compression Gage Pressure: 103 lbs. at cranking speed. Ratio 6.2 to 1.

Generator Rate Adjustment: Voltage regulator.

Steering Gear Adjustment: Saginaw; warm and double roller, straddle mounted.

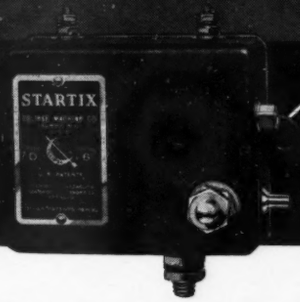
Carburetor Adjustment: Carter WDO-345S.

Clutch—Borg and Beck, model 897.

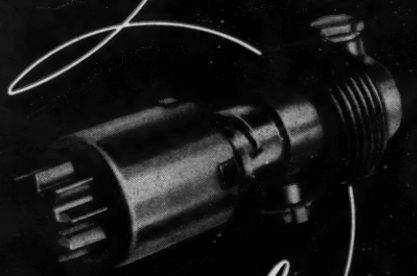
Universal Joints: Mechanics needle bearing.

Battery Terminal Grounded: Negative.

There's *real profit* selling "MODERNIZED STARTING"

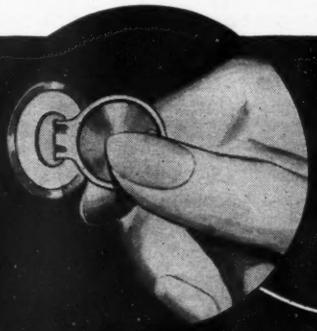


STARTIX *plus* BENDIX DRIVE



equals

AUTOMATIC STARTING



• Startix-Automatic Starting is appealing—reassuring—fascinating. At a turn of the switch key the engine starts—no reaching for a starter button. Drive awhile; then if you wish, put on the brake and stall the engine. Again it starts—repeating as often as you please—automatically, promptly, unfailingly.

That is why owners are enthusiastic about Startix, women drivers especially. Once they have become used to complete automatic starting they will never willingly drive without it.

Startix plus the Bendix Drive provides the one complete 100% *automatic starting*. Startix lists at $8.50. Practically any make of car equipped with Bendix Drive is ready for Startix installation at a small cost. Ask your distributor or write us.

ECLIPSE MACHINE COMPANY
ELMIRA, NEW YORK
(Subsidiary of the Bendix Aviation Corporation)

Parts Service STANDARDIZED

with the one Complete Line..

KING QUALITY

All under one name—and one national service. The complete line for every make and model car.
Super-X
Complete distribution and service facilities on King Parts in your own community—for your convenience.
Engineered and produced by the most complete manufacturing facilities in the world for auto replacement parts.

KING QUALITY PRODUCTS

Use Genuine

KING QUALITY PARTS

KING QUALITY PRODUCTS COMPANY • St. Louis, Mo.

Your customers are hearing... "and how!"

AC ADVERTISING IS TELLING THEM EVERYWHERE—and OFTEN

The biggest advertising campaign in AC history is telling the Blue Top Story. Week after week, spark plug users are hearing and reading about this new, higher quality spark plug line. In the month of May alone, AC advertising will reach 67 million people!

Remember, the AC Blue Top line means:

Only 27 types—instead of 82 . . . Smaller investment . . . Faster turnover . . . Bigger profit . . . A better plug, servicing all types of engines, assuring satisfaction to your customers . . . All of the advantages of the 1936 Regular, Long Life, Universal, and Tractor lines now combined into one line.

Be prepared to serve your trade with AC Blue Top plugs—for Blue Top greater profits. Get your assortment. Keep it complete.

See Your AC Wholesaler's Salesman Today

CASH IN ON PLUG CLEANING . . . the greatest sales success in the industry!

AC furnishes Registered Cleaning Stations with special, free window displays, selling displays, posters, window stickers, etc. The official Registered Sign is illustrated in every AC national ad. This all builds business for retailers. If you are not yet registered for 1937, get in touch with your AC Wholesaler now—so you can get all the advertising material.

The AC Replacement Line *IS A GREAT OPPORTUNITY!*

Kleer-Kleen Oil Filters • Air Cleaner Elements • Air Cleaners • Passenger Car Oil Filters • Remo • Spark Plug Cleaning Machines • Reflex Signals • Plug Cleaning Compound • Fuel Pump Parts • Blue Top and Titan Spark Plugs

AC SPARK PLUG DIVISION
General Motors Corporation
FLINT, MICHIGAN

Full Swing Production

The new assembly line set up for the brake drum lathe manufactured by the Van Norman Machine Tool Co., Springfield, Mass., is in full swing. Purchase was announced by Van Norman, last August, of the brake drum lathe business of the L. D. Aff Machine Works, San Francisco. The lathe has been thoroughly re-engineered, the factory states, and is now in full production. Exclusive features include a rotating spindle that slides horizontally, a multiplicity of feeds (six forward, six reverse), and a grinding attachment that can be universally applied to all brake drums.

APEM Employment Higher

A survey recently completed by Automotive Parts & Equipment Manufacturers' Association of 274 identical companies for the four-week period ending in January, 1937, against January, 1936, shows that 24.8 per cent more workers were employed by this industry this year than last. These 274 companies, located in 21 states, represent every type of automotive part and accessory manufactured. Total factory employment for these companies during January was 148,238 as compared with 118,766 in January, 1936.

The total payroll for January was $15,058,000, an increase of 30.3 per cent over the same month of 1936. The average hourly rate of pay for all male and female factory employes, regardless of the type of work performed, was 68 cents an hour, an increase of 8.1 per cent over last year and an increase of 24.1 per cent over January, 1934.

Due to the General Motors strike, the average hours per week worked by each productive employe dropped during January of this year to 35.1 hours as against 36.2 hours last year but, even with the drop in the average hours worked, each employe earned an average of 4.9 per cent more per week than he did last January and 32.3 per cent more than he did during January of 1934.

. . . . . **Hookin' a Ride** . . . . .

Amco BRAKE LINING

"When it's a whole mile to the swimmin' hole yuh can't expect a guy to *hoof* it, can yuh? Course, if we get shook off it'll be just too bad, 'specially if the next car's brakes are punk. I'd hate to get hurt the very first week of vacation—wouldn't you?"

ASBESTOS MANUFACTURING CO., Huntington, Ind.

Staerk Promoted

F. O. Burkholder, vice-president of the Ahlberg Bearing Company, Chicago, recently announced the appointment of P. H. Staerk as manager of their industrial division in charge of distribution and production sales of mounted bearings. This is in line with the company's recently announced expansion program. Since starting with the company in 1920 as salesman Mr. Staerk has been successively branch manager at St. Louis and Detroit. For the last several years he has been specializing in the sale of bearings for power transmission equipment.

Sealed Power Shipments Up

C. E. Johnson, president of the Sealed Power Corporation, Muskegon, Mich., announced last month that shipments of piston rings in the first quarter of 1937 exceeded every preceding quarter in the history of the company. Shipments totaled 18,988,423 piston rings compared with 9,773,214 in the first quarter of 1936—a gain of 94 per cent.

"All lines of business shared in the increase," said Mr. Johnson. "The sales volume of pistons, piston pins and cylinder sleeves showed an increase of 24 per cent in the first quarter of this year as compared with the first quarter of 1936. Replacement sales to thousands of car dealers and repair shops went up sharply as well as original equipment sales to leading passenger car, truck and engine manufacturers. Export trade is also growing. Twenty per cent more piston rings were shipped in March than in any other month since the company was founded 26 years ago."

Raybestos-Manhattan Board Elections

At a recent meeting of Raybestos-Manhattan stockholders, Robert B. Davis, general sales manager of the Raybestos Division, was elected to the board of directors. Mr. Davis joined the organization 22 years ago as a salesman and has been sales manager for 14 years. At the same time, Robert Abbott, general manager of Canadian Raybestos, Ltd., and John Merrill, a Raybestos-Manhattan vice-president, were also elected to the board.

Becomes Sales Promotion Manager

Richard G. Warner has resigned his position at Asbestos Manufacturing Co., Huntington, Ind., to become Sales Promotion Manager for Horton Manufacturing Co., Fort Wayne, Ind.

CHRYSLER DEALERS ARE MAKING HISTORY WITH AMAZING NEW CHRYSLER ROYAL!

ANOTHER YEAR . . . another greater success! Chrysler's invasion of the low-priced field has opened an enormous new market for Chrysler dealers.

The new Chrysler Royal is a new kind of car in the low-priced field . . . big, beautiful, smartly styled . . . powerful, roomy, yet amazingly economical with its brand new Chrysler Gold Seal engine.

Probably no new car ever received such immediate acclaim from owners. Straight across the country, enthusiasm has spread like wildfire.

With the new Royal . . . the Imperial and Airflow . . . with the ever-climbing Plymouth . . . Chrysler dealers are writing a new page in the history of their amazing progress.

Bookkeeping

(*Continued from page* 31)

sponding sheets in the General Ledger. All items which have been termed Assets should be written on the debit or left side of the ledger sheet and all Liabilities written on the credit or right side of the ledger sheet. If you will refer to the Chart, which will serve as your guide throughout, you will find everything ties in together. You have now established a Trial Balance and entered each item on the necessary sheet. This book is now laid aside and will not be used again until the end of each month.

The Sales Analysis Book is the next to be considered. The type of book suggested for this purpose can be secured from any stationery store and has 12 columns to the right and a date and name space to the left. This book can be procured in 150 and 300 pages. As only one page is used each month for cash sales and one for charge sales, a book of 150 pages would last approximately six years.

If you will refer to the Chart, you will note the Sales have been separated as to departments. Write down on the Sales Book as a heading for each of the columns, the corresponding departments of sales. This will use up ten columns and skip the next column and in the last column write the heading "Total." At the very top of the page in large letters write "CASH SALES." Now on the next page write in the same headings but at the very top write "CHARGE SALES."

As the cash sales are produced through a cash register, it is very important that you have a register that will meet the requirements. It should have enough keys to take care of the different departments of sales and also one for punching when a customer pays a bill that has been charged. For example, a sale for gasoline is rung up and the key "Gs" punched which will print "Gs" along side the amount of money received. If the letters on the register do not correspond with the departments on the chart, they can easily be made to do so by having the company from whom the register was purchased, make the changes. A key marked "RC" is equivalent for "Received on Account" and should be punched whenever money is rung up to pay for a charge account, and the name of the person paying or whose account is being paid should be written in pencil alongside of the amount. No payments for parts purchased should be made out of the cash register, as it is confusing and often times causes mistakes when figuring the amount of sales for the day. Such payments should be made by check and if the check is made out to "Cash" to pay several small items, the items should be noted on the check stub in order to know just what was paid for each one.

At the end of each day's business, the cash register tape should be removed and the cash counted. The total of all money in the register should be the same as that which is recorded on the register. The register should then be turned back to "O" ready for the next day. It might be suggested to keep $5.00 in change and small bills in the cash register in order to have enough money in case the first customer of the day has a large bill to be changed. Be sure and remember to always put back $5.00 into the register each day and not add that in when figuring the sales for the day.

The cash register tape is now handed the bookkeeper to be analyzed and entered in the Sales Book. First look down the list and see if there was any money received on a charge account, if so, subtract this payment from the total of the register reading which should be written on the register tape. The difference between these two figures is the amount of cash sales for the day. On a piece of scrap paper list all the amounts rung up as gas sales, all those rung up as parts sales, and so on until you have separated all the sales and totaled each department. All these separate totals added together should equal the amount listed at the top of the tape as Cash Sales. These figures now are ready to be written down in the Sales Book under the different headings which will correspond with your classification. Write the day's date in the date column and use only one line for each day. After each classified figure has been written in its proper column the total should be written in the total column. Be sure these figures are writen on the page headed "CASH SALES." The cash register

POLISH AS HARD AS YOU LIKE—

You Can't Hurt the Finish with this PNEUMATIC POLISHING HEAD

Now you can have mechanical polishing without the danger of injury to the finish. Any mechanical device equipped with this pneumatic polishing head can be used with absolute safety and utmost efficiency, even in inexperienced hands.

The pneumatic cushioning of this head gives all the softening desired, and with only one bonnet. With the pneumatic polishing head there is no need to employ two and three costly lambswool bonnets, as is so often necessary with the conventional hard rubber disc polishing heads. The pneumatic polishing head will pay for itself in the savings of bonnets alone.

More polishing jobs can be done, more polishing money made, when all polishing work can be done safely and efficiently. Put all your mechanical polishers back to work by equipping them with these pneumatic polishing heads. Adapters can be furnished for any motor. This pneumatic polishing head can be purchased in a set, complete with lambswool, felt, and cotton covers, and adapters; or separately. Ask your jobber or write.

Cross section shows air chamber and valve which produces pneumatic cushion in fabric and rubber head.

Manufactured by

AIR PRODUCTS COMPANY

ROCKFORD, ILL.

Address All Correspondence to

A. F. STRAWSER COMPANY

ROCKFORD, ILL.

tape should be kept in a box file for register tapes. This consists of small envelopes, one for each day of the year, and are generally supplied by the manufacturer of the cash register.

Charge Sales should be recorded in the following manner. There are two ways in which these can be kept, one by making a duplicate sales record on a pad or by having a regular sales register which contains these sales slips in duplicate and are torn off as each one is recorded. The original slip is given to the bookkeeper for billing and the duplicate to the customer. In all cases of charges, be sure and have the customer sign the slip in duplicate, thereby doing away with trouble when billing. These charge slips should be kept in an alphabetical box file and bills made out once a month. To save time at the end of the month, the bill can be started whenever convenient and as more charges are made, they can be added from day to day and kept filed until the end of the month. The proper disposition of these bills will be explained further on.

To enter these charge slips in the Sales Book, the total charges for the day should be added and the total entered on the page headed "CHARGE SALES" and separated as to classification of sale, using one line for each day and writing the date in the date column.

When a car comes in for storage, the customer should be given a ticket and another ticket with the corresponding number thereon attached to the car. If the customer pays for the storage when he takes the car, it is rung up as a cash sale and the key "St" punched indicating a cash sale for storage. If the customer wishes to take a charge for the storage, a charge slip is made out, customer signs, receives the duplicate copy and the original goes to the bookkeeper for billing.

Checking up on the gas pumps is another important factor in a service station. A reading at the end of each day should be taken and subtracted from the reading of the day before to get the number of gallons sold that day. For the purpose of checking this gas it would be well to keep a gas record book and write down in this book the amount of gas sold and whether it was regular or ethyl gas in order to keep a check on both kinds. An inexpensive book can be used for this purpose and headed up as follows:

(Date)

Gallons Regular	Gallons Ethyl		Charge	Cash
5				1.00
10				2.00
	2			.40
5		John James	1.00	

With the above entries made at the time of each sale, it is easy to account for the correct number of gallons sold and when totaled at the end of the day should equal the number of gallons recorded on the gas pumps. In the case of a mechanic using one or two gallons for cleaning parts, etc., it should be recorded as a charge and a charge slip made out charging the shop for the gas. This slip is kept by the bookkeeper for proper entry in the Cash Book which will be explained later.

The bills sent out should be made in duplicate. The original should be a regular billhead containing the name of the repair shop, address and telephone number and whatever the owner desires printed thereon. The duplicate can be a plain sheet of manilla paper and after bills have been mailed should be filed away alphabetically with the charge slips for that particular bill.

Before mailing the original bills, they must be recorded on ledger sheets. One for each customer and the total amount of the bill written thereon with the date recorded also. The ledger sheets made this way are termed "Accounts Receivable Ledger" and can be kept in the same binder as the "General Ledger" and the same type of sheet used. See form No. 1. But they must be kept by themselves and separated by an alphabetical index file. The entry made on these sheets will be on the debit or left side of the sheets.

(The next installment will explain the Cash Book, its uses and full detail of all entries thereon. Look for it in an early issue.)

Blinding fog never halts cars equipped with Arrow Driving Lamps. That's because these lamps are not just gadgets made to cash in on a new fad. They definitely contribute to "Safer Lighting and Safer Driving at Night."

Scientific ARROW Design makes Safer Lighting

When you compare the Arrow Driving Lamp with ordinary "amber glow" lamps, you'll recognize a difference! Check the scientifically designed lens . . . and the highly polished silver reflector . . . the rugged, heavy gauged metal of the shell and clamps. ARROWS are different!

Demand, insist upon and get this extra Arrow Quality—it costs no more!

Arrow Signals Legally Approved

Install Arrow Directional Signals, not just to be within the law, but to add safety to "payloads." The Arrow Line includes all popular approved combinations. Arrow is the choice of fleet operators and truck manufacturers everywhere.

Ask Your Jobber

ARROW SAFETY DEVICE COMPANY, INC.
MEDFORD, NEW JERSEY

Ignition Pointers

(*Continued from page* 19)

eight whose cylinders form an angle of 60 deg.: The one interval, as previously mentioned is the angle between the cylinder blocks which in this case is 60 deg. To find the other interval, divide 1440 by 8 (the number of cylinders). This gives 180. Then from 180 subtract 60 (the angle between the blocks) which gives 120 deg. as the other interval as measured on the flywheel. The firing intervals on the flywheel are therefore 120 deg., 60 deg., 120 deg., 60 deg., etc. To change this to distributor rotation it is only necessary to divide by 2, and the firing intervals become 60, 30, 60, 30, etc.

However, care must be exercised so that cam angle and firing intervals are not confused. To repeat, cam angle is the number of deg. that the breaker points are closed, while firing interval is the number of degrees between the opening of the two sets of breaker points.

Fortunately, with most flywheels and vibration dampers marked it is seldom necessary to make such calculations. Of course when it comes to actually timing the distributor, it is advisable to first synchronize the points by means of specialized equipment, which permits accurate setting of the cam angle and then the unit can be timed to the engine by means of a neon type timing light.

'HALLOWELL'

Lifetime EQUIPMENT

Fig. 992

"HALLOWELL" Semi-Portable WORK BENCH OF STEEL

In a way it suggests a wheelbarrow; grab the handles and trundle the "HALLOWELL" around anywhere. Let go, and it lands on its plain feet, when at once it becomes a perfectly steady work bench . . . on the very spot you want it—to be moved away again, quickly, easily — so different from ordinary benching, which, once planted, stays put, oftentimes occupying floor and wall space which could have been used to better advantage.
The handles swing down and out of the way when not in use, and, to prevent shimmying, the casters do not swivel. *Write for Bulletin.*

"HALLOWELL" STEEL WORK BENCH

Strong, rigid, with one piece, smooth steel top, easy to keep clean. Of welded construction, they can't get wobbly—and can't splinter or burn. Best of all, they're inexpensive. Of the 1368 types and sizes, there's one made exactly for you. *Bulletin gives details.*

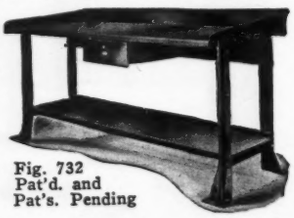


Fig. 732
Pat'd. and
Pat's. Pending

Fig.
1112

"HALLOWELL" STEEL TOOL STAND

A Stand that can be locked, yet is always open for inspection as to its contents.
Portable — able to be moved from job to job—wherever it's required! No wonder hundreds are used in the motor industries, where its convenient features suit it perfectly to so many needs. There's a type for every purpose—and your copy of our Bulletin will give you the details.

"HALLOWELL" STEEL BENCH DRAWERS

Can't shrink, swell, stick or jam. Wears far better, lasts much longer than wooden drawers. Has dirt and dust proof cover, and convenient tray for small precision tools. *Get Bulletin.*

STANDARD PRESSED STEEL CO.

BRANCHES: BOSTON, DETROIT, INDIANAPOLIS

JENKINTOWN, PENNA.
Box 561

BRANCHES: CHICAGO, ST. LOUIS, SAN FRANCISCO

How We Buy

(*Continued from page* 23)

he sees new equipment in the shop. For this reason we make it a practice to paint our heavy equipment as frequently as possible, so as to make them look new.

"Originally the heavy equipment was painted black. Just as soon as the equipment began to look old we painted it gray. About six months later we applied green paint. Today the equipment bears a coat of bright red paint. Each time we changed the color of equipment customers invariably commented on the fact that we had new equipment. We have always noticed that whenever the equipment was modernized in this manner our mechanical volume jumped accordingly.

"Besides the freshly painted heavy equipment, usually an eye sore, adds to the attractive appearance of the shop. We believe we have one of the cleanest shops in town. One reason why our shop is so clean is that it is our policy never to stock on old parts from cars serviced by us. We throw them out. We have found that when old parts are seen lying around in the shop the customer easily gets the impression that they are being used in place of new parts.

"We average at least one rebore a week. As most of our work is on large, expensive cars, the rebore averages around a hundred dollars. This adds to our revenue. The way we sell rebores is to actually take off the head in the presence of the owner and show him that the engine actually needs a rebore. It takes an hour or so to make the demonstration, but it is well worth the time and trouble, because we sell the complete job."

Bearings

(*Continued from page* 21)

bearing. Aside from an inspection by "feel" for rough spots, the only check that can be made is for endplay. A new bearing of this type has from .008 to .010 in. endplay, and if the mechanic doesn't know that it is supposed to be that loose he will be inclined to throw it away as worn out. As a matter of fact, it should not be thrown away until the amount of endplay exceeds .015 in., unless, of course, there are rough or "tight" spots felt when the bearing is turned by hand.

Ball bearings used on differential carriers are also built with considerable endplay, a new bearing having as much as .020 in. This type of bearing is very loosely assembled, and in some cases can be pulled apart with the fingers. Care must be exercised when removing this bearing from the carrier to be sure that the puller has fingers that will contact the inner cone—otherwise the bearing is certain to come apart if a pulling effort is applied to the outer race.

These bearings are classed by some as pre-loaded bearings, inasmuch as they are quite heavily loaded during the process of adjusting them. One bearing opposes the other, and when installed on the carrier the largest face of the inner ring of the bearing

(*Continued on page* 64)

I.A.E. TESTS SHOW-

APPROXIMATELY 1/2 THE WEAR IN NEW ENGINES

"Dag" colloidal graphite, long used as a motor oil adjunct, has been well termed a "shock lubricant". This, because it comes into play during starting and times of stress such as lead to oil film rupture. While its function in those cases is to lower friction thus retarding seizure, there is also a wear aspect of much importance involved. That colloidal graphite reduces wear in a new engine, especially under conditions of cold starting, is seen in an engineering test conducted by The Institution of Automobile Engineers. The results of their test are officially summarized as follows:

"A sample of running-in compound containing 'Acheson's' colloidal graphite-'dag' Brand-was submitted on April 4th, 1935, for test purposes with respect to its effect on cylinder and piston ring wear in a new engine during the running-in period. Comparative tests were carried out on a plain oil and on oils containing proportions of running-in compound recommended by E. G. Acheson, Ltd. An unused cylinder barrel and unused piston ring were used in testing each lubricant and the test procedure involved repeated starts from cold, so that a certain amount of cylinder corrosion probably occurred. The results show that during the running-in period the wear with oil containing colloidal graphite was approximately half that observed with plain oil."

For and on behalf of
The R. and S. Committee of the I. A. E.
(Signed) C. G. WILLIAMS,
DIRECTOR OF RESEARCH

Write for technical folder giving greater detailed information.

Ask your oil supplier about his "dag" colloidal-graphited lubricants today

ACHESON COLLOIDS CORPORATION · PORT HURON, MICHIGAN

REG U.S. **dag** PAT OFF.

COLLOIDAL PRODUCTS

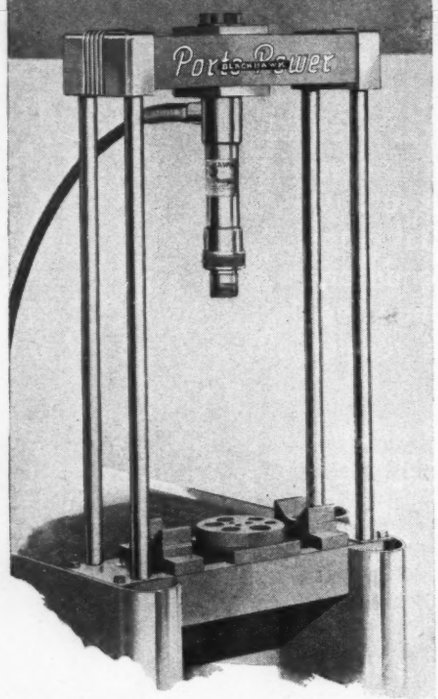
COPYRIGHT 1937, ACHESON COLLOIDS CORP.

COLLOIDAL GRAPHITE

DAG COLLOIDAL GRAPHITE IS A 100% AMERICAN MADE MATERIAL

THE Workshop End OF Porto-Power

4 COLUMN PRESS WITH POWERFUL HYDRAULIC RAM

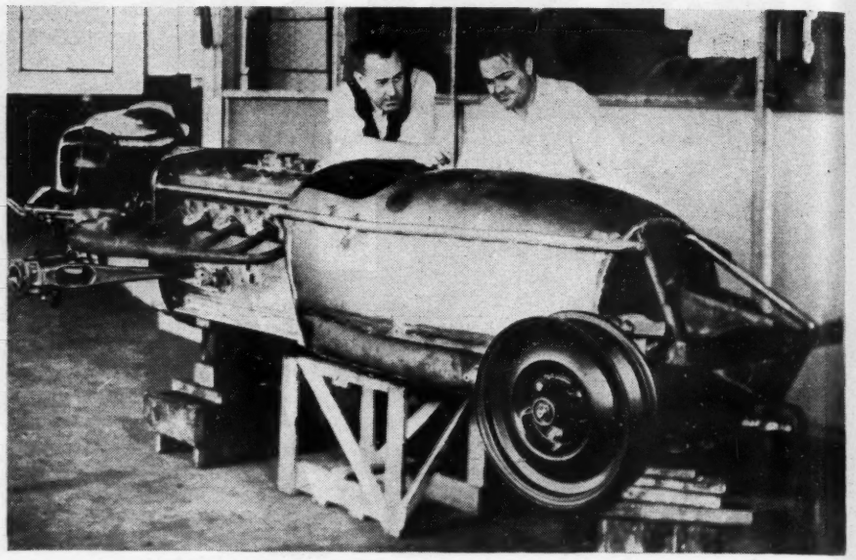


Here's a Close-Up of the New S-100 Porto-Power Press:

Bigger — greater strength and capacity — more uses. Four-column type — sliding ram head with provision for locking ram at any desired point. Top and base made of steel rectangular sections so "V" blocks, plates or other accessories can be moved to line-up with ram. Press has 15" clear width between posts — and 15" clearance from base to ram plunger (collapsed). 3½" between bars permits inserting long workpieces. Ample space below press provided by special design of Porto-Power stand.

BLACKHAWK MFG. CO.
Dept. MA-5 MILWAUKEE, WIS.

BLACKHAWK Porto-Power



LEE OLDFIELD (left) and his assistant, Johnny Rae, looking over the 16-cylinder engine with a cockpit mounted in front, which by its radical design promises to be one of the sensations at Indianapolis, May 31. Oldfield says the car will have a top speed of 165 m.p.h., and average speed of 141 m.p.h. and should run the 500 miles at 115 m.p.h. average. The car is being built for Joe Thorne

Racing Schedule

Five major automobile racing classics, including the Indianapolis "500" and two events at the new Roosevelt Raceway, are on the schedule of races just announced by the Contest Board of the American Automobile Association from national headquarters in Washington, D. C.

Ted Allen, Contest Board secretary, in releasing the card says it is one of the finest early-season schedules compiled by the governing body in several years.

A new classic to this year's schedule so far is the 300-Mile Pan-American race which has been designed as one of the high lights of the Pan American Exposition at Dallas, Texas, on Aug. 1.

Starting off the big league season as usual is the 500-Mile International Sweepstakes at the historic Indianapolis Speedway on Decoration Day, Monday, May 31.

Next in line comes the George Vanderbilt Cup classic at the new Roosevelt Raceway, Westbury, Long Island, N. Y. on July 5. This event was presented on Oct. 12 when the track had its premier in 1936.

Following the Dallas race on Aug. 1, the speedway stars will return to Roosevelt Raceway on Sept. 6 for a 500-Mile Pan-American Sweepstakes open to drivers from North and South America. Europeans will not be eligible for this event, according to the AAA Contest Board.

The only National Championship classic on the mile dirt tracks is scheduled so far at Syracuse, N. Y., again under the managership of Ira Vail, veteran driver who hung up the goggles a number of years ago to assume the role of promoter, will be 100 miles.

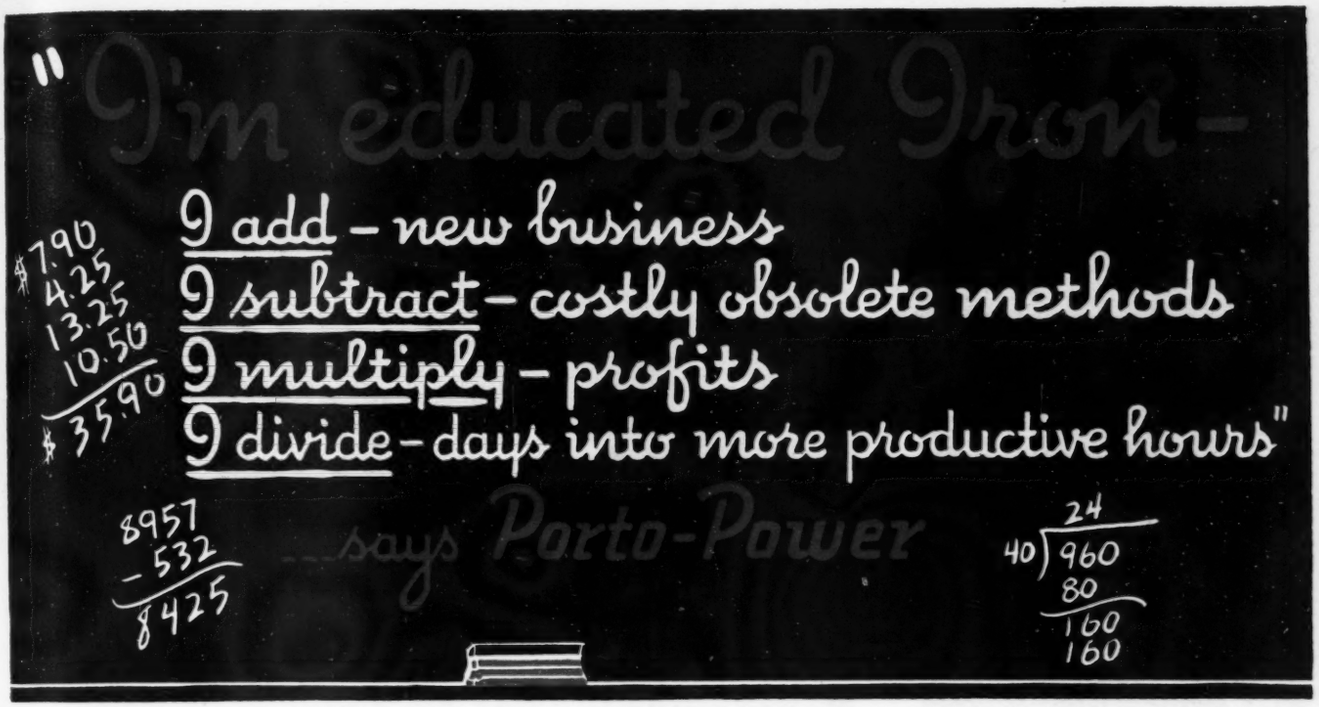
The 1937 season's schedule opened April 25 at Reading, Pa., when Tony Willman won the final event.

Following is the complete schedule of races so far approved by the AAA Contest Board, to which other events will be added as the season progresses: (Please check with track officials before attending races as dates are subject to change.)

Date	Place
April 25	Reading (Pa.), Fairgrounds.
May 2	Hohokus (N. J.), Speedway.
May 9	Union (N. J.), Speedway.
May 16	Roby (Chicago), Speedway.
May 16	Langhorne (Pa.), Speedway.
May 30	Trenton (N. J.), Fairgrounds.
May 31	Indianapolis Motor Speedway.
May 31	Hohokus (N. J.), Speedway.
May 31	Altamont (N. Y.), Fairgrounds.
May 31	Readville (Mass.), Speedway.
June 6	Roby (Chicago), Speedway.
June 12	Mineola (N. Y.), Fairgrounds.
June 13	North Randall Spdwy., Cleveland.
June 13	Langhorne (Pa.), Speedway.
June 20	Hohokus (N. J.), Speedway.
July 4	Hohokus (N. J.), Speedway.
July 5	Roosevelt Raceway, Westbury, L. I.
July 18	Roby (Chicago), Speedway.
July 25	Hohokus (N. J.), Speedway.
July 31	Harrington (Del.), Fair.
Aug. 1	Pan-American Exposition, Dallas, Texas.
Aug. 7	Lewistown (Pa.), Fair.
Aug. 13	Altamont (N. Y.), Fair.
Aug. 14	Altamont (N. Y.), Fair.
Aug. 15	Hohokus (N. J.), Speedway.
Aug. 21	Middletown (N. Y.), Fair.
Aug. 21	Springfield (Ill.), Fair.
Aug. 22	Roby (Chicago), Speedway.
Sept. 4	Flemington (N. J.), Fair.
Sept. 6	Flemington (N. J.), Fair.
Sept. 6	Roosevelt Raceway, Westbury, L. I.
Sept. 6	Hohokus (N. J.), Speedway.
Sept. 6	Readville (Mass.), Speedway.
Sept. 11	Rutland (Vt.), Fair.
Sept. 11	New York State Fair.
Sept. 18	Reading (Pa.), Fair.
Sept. 19	Roby (Chicago), Speedway.
Sept. 25	Nashville, Tenn.
Sept. 25	Allentown (Pa.), Fair.
Sept. 26	Hohokus (N. J.), Speedway.
Oct. 2	Virginia State Fair, Richmond.
Oct. 2	Trenton (N. J.), Fair.
Oct. 9	Wilson (N. C.), Fair.
Oct. 9	Shelby (N. C.), Fair.
Oct. 12	Readville (Mass.), Speedway.
Oct. 16	Spartanburg (S. C.), Fair.
Oct. 16	Raleigh (N. C.), State Fair.
Oct. 17	Hohokus (N. J.), Speedway.

Rose in Burd Piston Ring Special

A flash received as MOTOR AGE went to press stated that Mauri Rose, reigning National Champion, will drive the Burd Piston Ring Special at Indianapolis, May 31. Other Burd equipped cars will be driven by Tony Gulotta and Chet Gardner.



YES, SIR — Porto-Power actually seems brainy.. the way it outwits every hard-to-do job that it goes up against. It has PROVED its "metal" to thousands of garage, service, and body-shop men by its uncanny ability to turn time into money.

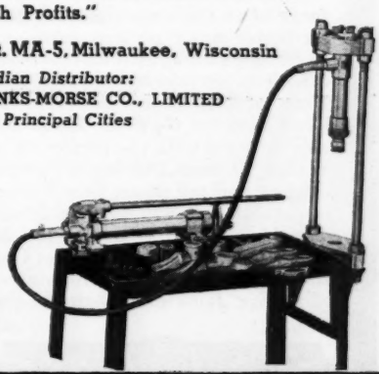
Take a look at that sensation of 1937 — the new S-100! See how it is designed to do more jobs — and do them better, quicker, easier than ever before. Big 4-column press — remotely controlled *all-directional* hydraulic ram — streamlined welded-steel stand with rubber-matted steel drawer and accessory tray. Yes, and the exclusive new "Flex-Heads" and other improved accessories — to take the grief out of body and frame work—straightening—bending, pushing, pressing—and hundreds of other tough jobs that are "easy picking" when you own a Porto-Power.

S-100
Dealer Price
$195.75
Slightly higher on West Coast and in Canada.

Get your jobber salesman to give you a demonstration of the new S-100 Porto-Power or the S-50 shown below — and send for FREE booklet "Crash Profits."

BLACKHAWK MFG. CO., Dept. MA-5, Milwaukee, Wisconsin

Exclusive Canadian Distributor:
THE CANADIAN FAIRBANKS-MORSE CO., LIMITED
Branches in All Principal Cities



MODEL S-50
— standard Porto-Power — backed by a record of over 10,000 satisfied users. Not as complete as S-100, has only 28 attachments.
Dealer Price $114.50
Slightly higher on West Coast and in Canada.

AUTOMOTIVE EQUIPMENT
TIME PAYMENT PLAN

Patent Applied For

BLACKHAWK Porto-Power
BLACKHAWK MFG. CO. MILWAUKEE, WIS. U.S.A.

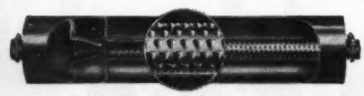
See opposite page

BLACKHAWK Porto-Power

HOW TO MAKE
More Money
FROM
Lubrication Customers

Check the exhaust system on every car you grease.. for leaks, loose connections and worn-out parts. Make this standard routine in your lubrication department. It's a splendid source of extra profits.

Sell every customer on the importance of an efficient exhaust system for better motor performance—and as a safe-guard against carbon monoxide gas. Surveys have proved that 1 out of 2 cars have defective exhaust systems. Go after this profitable business with the perfect fit of Walker Silencers, 360 degree clamps, exhaust and tail pipes. Free Walker inspection tags will help merchandise this service. See a Walker jobber. WALKER MANUFACTURING CO., Racine, Wisconsin.... *Also makers of Walker Jacks and Electric Lifts.*

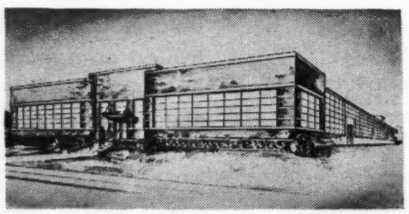


WALKER
Exhaust Silencers

A SERVICE bullet. This unusual truck, designed to expedite the refueling of planes at Croydon Airdrome, London, has a single front wheel, making it easy to maneuver in and about the narrow spaces of the airdrome

Repairman's Visit To The

FACTORIES



DeVilbiss Expansion

The DeVilbiss Company will expand its rubber products division at Toledo, Ohio, through the erection of a new plant on Lagrange Street near the Ottawa River, it was announced by Allen D. Gutchess, president of the company. The new plant, 120 feet by 440 feet, will be of single story monitor type design with 55,000 sq. ft. of floor space, and will represent an investment of approximately $250,000 in building and equipment.

Miller Made Graham V-P

L. A. Miller, formerly president of Willys-Overland, has been elected vice-president of Graham-Paige Motors Corporation and has assumed full charge of Domestic Sales, Merchandising and Service, Robert C. Graham, executive vice-president, announced last month.

Chevrolet's Musical Moments

Chevrolet's new Musical Moments Revue program made its debut last week over the largest group of radio stations ever used on any sponsored program—with 401 stations in 341 cities broadcasting these programs, most of them three times and others twice a week.

Abeles Appointed

Charles Abeles recently joined the sales organization of Easton Car & Construction Co., Easton, Pa., makers of wheeled haulage equipment. Mr. Abeles' headquarters are at the New York offices of the company.

Van Norman's New Plant Annex

Shown above is part of the first floor of the recently completed addition to the Van Norman Machine Tool Company's plant on Wilbraham Ave., Springfield, Mass. The new annex includes 14,000 sq. ft. of floor space, in which has been installed $100,000 worth of new production machinery. Demand is reported steadily on the increase for the Van Norman line of universal milling machines, and radius grinders, while sales in the companion line of automotive service equipment — including boring bars, piston grinders, brake drum lathes and valve tools—are also on the up-curve.

Go Where You See This Display

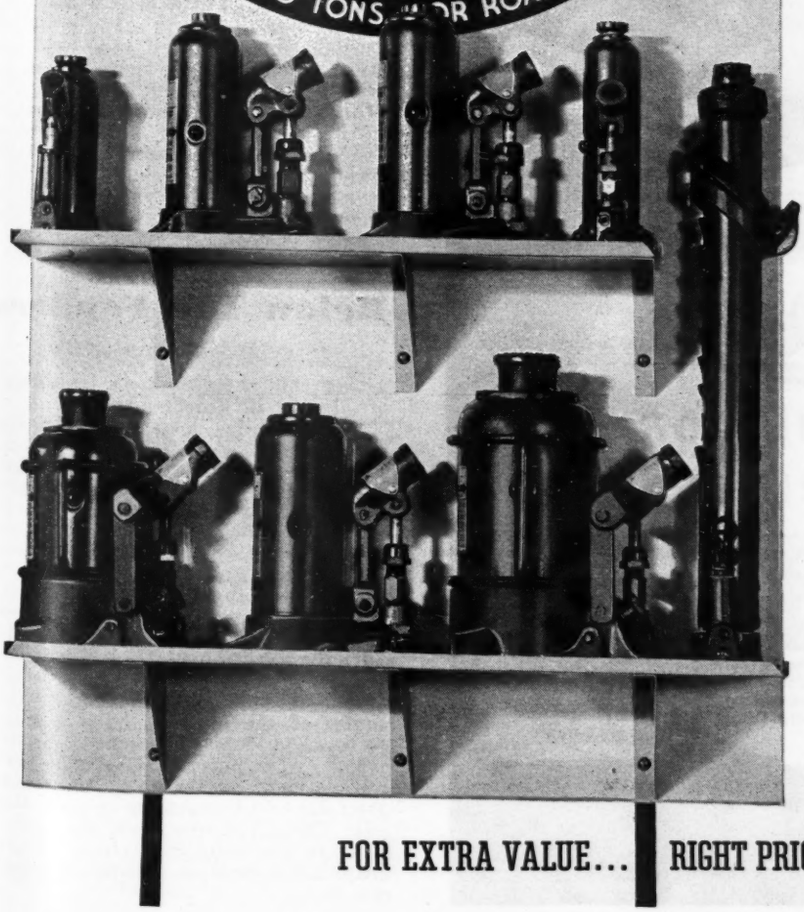
DEALER— THOSE WALKER HYDRAULICS ARE FINE-LOOKING JACKS AND I DIDN'T REALIZE THEY WERE PRICED SO LOW.
JOBBER SALESMAN— YES...WALKER HYDRAULICS ARE PRICED WITH THE LOWEST--- AND THERE ARE NO BETTER JACKS MADE.
1
DEALER— I LIKE THAT BUMPER JACK— HOW MUCH IS IT?
JOBBER SALESMAN— ONLY $4.95— AND IT IS A FAST MOVING NUMBER, FOR RESALE AS WELL AS SERVICE USE.
2
DEALER— I'LL TAKE TWO OF THOSE BUMPER JACKS AND ONE OF THOSE BIG BOYS FOR BENCH WORK.
JOBBER SALESMAN— MISTER, YOU CAN'T BUY BETTER JACK VALUES.
3

Here They Are!

WALKER HYDRAULIC JACKS

CAPACITY FROM 1½ TO 20 TONS ... FOR ROAD, SHOP & BENCH SERVICE

Featuring
- Automatic Safety Valve
- Removable Oil Filter Screen
- Centered Pump and Handle Socket
- Many Other Exclusive Qualities



● **Here are the right hydraulics for modern service—rugged, powerful jacks—built to give you maximum ease, speed and dependability. Every model is designed to answer a definite service need—for lifting cars, trucks and buses—for road service and heavy-duty shop or bench jobs that require power units for pushing, bending and straightening. Walker prices make all these hydraulics outstanding values. See them on display at your jobber's. WALKER MANUFACTURING COMPANY, Racine, Wis. •** ***Makers also of Walker Electric Lifts and Exhaust Silencers.***

WALKER HYDRAULIC PRICES

No. 905—1½ tons	$ 3.30
No. 900, Bumper Jack—1½ tons	5.60
No. 915—2½ tons	6.65
No. 925—3½ tons	8.50
No. 930—5½ tons	10.50
No. 935—7½ tons	14.00
No. 936—7½ tons	15.00
No. 945—12 tons	21.00
No. 946—12 tons	21.00
No. 950—20 tons	35.00
No. 951—20 tons	38.00

All prices dealer net, slightly higher west of Denver and in Canada.

FOR EXTRA VALUE... RIGHT PRICES... UNEXCELLED PERFORMANCE

Bearings

(*Continued from page* 58)

should always be installed next to the shoulder on the differential hub. Tighten the adjusting nut on the bearing next to the ring gear until the gear is up against the pinion and all backlash is removed. Then back the adjusting nut off four notches, being sure that the lock lines up with the notch in the adjusting nut. Then tighten the adjusting nut on the opposite bearing, watching the outer race of the bearing. As soon as the race starts to turn, tighten the adjusting nut three more notches. Then back it off until the race stops turning. This is to be sure that the carrier is forced tightly into the bearing on the ring gear side. Next tighten the adjusting nut on the bearing opposite the ring gear until the race starts to turn, and continue to tighten it one and one-half notches more, or whatever fraction of a notch may be necessary to line up the lock with one of the notches. This will place the proper amount of preload on the carrier bearings.

There is only one way to accurately check the endplay in a ball bearing, and that is with a dial indicator. Mount the bearing on a shaft or spindle of some kind so that the inner cone will be held stationary. Then attach a dial indicator to the shaft on which the bearing is mounted, placing the button of the gage on the outer race of the bearing. By moving the outer race with the fingers from one side to the other, the amount of endplay can be checked and a decision made as to whether the bearing is standard or should be replaced.

EASY GRIP HANDLE
LIGHT, STURDY ALLOY HOUSING
1/4 H.P. MOTOR
BEARINGS COVERED WITH DUST PROOF SLEEVES
BALANCED ROTOR ON BALL BEARINGS
TOOL RESTS ADJUSTABLE AND REMOVABLE
COARSE AND FINE GRINDING WHEELS
NON-SLIP RUBBER FEET
3-CONDUCTOR RUBBER COVERED CABLE & PLUG
NEW
"Van Dorn"
6" JUNIOR
BENCH GRINDER
ONLY $19.95
See it at your jobber's—or write for catalog.
The Van Dorn Electric Tool Co.,
727 Joppa Road, Towson, Md.
(Div. of Black & Decker Mfg. Co.)
AUTOMOTIVE EQUIPMENT
TIME PAYMENT PLAN

Strike Losses Counted

(*Continued from page* 42)

upwards of 325,000 units from its potential output on account of strikes.

In other words, it might have shown a total of 1,623,000 units instead of 1,298,000 as now indicated. How much of this loss can be made up in the second quarter is a question. It was scheduled for near-capacity operations anyhow under normal conditions. Practical capacity of the industry is between 27,000 and 28,000 units daily, which if maintained for the 65 working days in the period would yield a second quarter output in the neighborhood of 1,800,000 units as against 1,477,652 in the corresponding period last year.

Packard production in March reached the new high figure for the company of 14,827. This compares with 6869 for March, 1936, an increase of 116 per cent. The previous highest month was last February, with 12,780 cars. Production for the first three months of this year was 38,315 compared with 16,579 for the first quarter of 1936. Present rate of production has risen to 680 units per day.

A gain of 52 per cent in Graham domestic retail deliveries for March as compared with February is reported. During March 1400 new cars were delivered to owners compared with 923 deliveries in February. The March figure also shows an increase of 38 per cent over January when 1017 cars were delivered. The company's total sales during the first six months of the present model year show a gain of 35.6 per cent over the similar period a year ago.

Below The Fenders

(*Continued from page* 34)

gether this represents an investment of $10,000 in shop equipment.

The shop is clean and efficiently laid out as shown in the illustrations. Six men are regularly employed under Mr. Christine, service manager. Quick service is a part of their selling plan and the shop has two tow-trucks and one motorcycle for pick-up and delivery service.

Mr. Cummings believes in direct, personal solicitation as the surest means of promoting business. He calls regularly on fleet operators, car dealers, repair shops and other sources of business. Knowing all the angles of the business he is able to go over a job, show the prospect exactly what must be done and quote a price right on the spot. He uses a portfolio of photographs to help him sell. These pictures show the equipment in the shop as well as photographic illustrations of what the shop can do.

More for the money

Hein-Werner Hydraulic Jacks are exceptional values . . . and today every model in this complete line represents *more for the money* than at any other time in the phenomenal growth of this company.

This popular line of jacks, all of which are *built right* and *priced right*, include the "Bullet" Model, 1½ ton capacity at $3.30 (West Coast $3.80) . . . Light Truck Special, 2 ton model, $4.40 (West Coast $4.95) . . . For light trucks, 3 ton models at $8.40 (West Coast $9.00) . . . 5 ton model, $10.50 (West Coast $11.25) . . . 7 ton models at $13.90 (West Coast $15.00) . . . For heavy trucks, buses and shop use—12 ton models $20.50 (West Coast $21.75) . . . 20 ton models, $34.50 (West Coast $36.00)—and for modern passenger cars, our new BUMPER-LIFT Model at a new low price of $5.45 (West Coast $6.00) . . . Above prices net to dealer.

Hein-Werner also makes a complete line of Service Jacks . . . Ask for details.

HEIN-WERNER MOTOR PARTS CORP.
WAUKESHA, WISCONSIN

FEW MODELS ENGINEERED TO DO THE WORK OF MANY
HEIN-WERNER hydraulic JACKS

Know Merchandising

(*Continued from page* 40)

filling station men are unnecessarily crippling their ability to give service because they are not properly equipped and do not carry adequate stocks of goods. You can correct this condition now. We are now in a rising price market. You can buy with safety, particularly when you use the facilities of your jobber who lives with you and whose success depends upon your success."

In discussing trends in legislation and certain court decisions, the speaker concluded:

"There is increasing evidence that legislation and court decisions will place the brakes on 'one-way' or 'blind alley' contracts through which under the so-called 'freedom of contract' the rights of others often are ignored and the public interest injured. Too long, in our opinion, this so-called 'freedom of contract' has been used as a cloak under which certain types of business have regimented businesses of others. Apparently the time is coming when this will no longer be true. It will be interesting to observe the effect of this new type of thinking as reflected in legislation and court decisions on lease and agency and other types of exclusive dealing agreements."

"Manual of Lathe Operation"

The Atlas Press Co., 1839 North Pitcher St., Kalamazoo, Mich., has issued a new "Manual of Lathe Operation" containing instructions on lathe operation, care of lathe tools, machinist's tables and illustrations of practically all lathe operations. Price $1.00.

1937 Tune Up Manual
Correction

In the April issue of MOTOR AGE, the 1937 Tune Up Manual published data on Graham series 95 and series 116 brakes which was incorrect. The correct information is as follows:

Graham Brakes
Series 95

Hydraulic with two firmly anchored rigid type shoes operating inside 9-in. steel drums. Lining is moulded type 1¾ in. wide x 3/16 in. thick and length per wheel is 18 in.

Graham Brakes
Series 116 and 120

Hydraulic with two firmly anchored rigid type shoes operating inside 11-in. cast iron and steel composite drums. Lining is moulded type 1¾ in. wide x ¼ in. thick and length per wheel is 23 in.

Adjustment
Graham Brakes Series 95, 116 and 120

To adjust set cam so there is .010 in. clearance at top of shoes. Then loosen shoe anchor nuts on inside of the brake support and turn eccentric anchor bolts until there is .006 in. clearance at the heel (bottom) of shoes. Re-check clearance at toe (top) of shoes and tighten anchor nuts securely. Fill master cylinder to proper level and bleed lines if necessary. The hand brake operates on a drum at rear of the transmission. Its lining size is 2 in. wide x 5/32 in. thick x 17¾ in. long, and should be adjusted to allow 1/32 in. clearance at all points between lining and drum.

Mechanical Specifications

These Specifications Are Brought Up-to-Date Each Month by the

Line Number	MAKE AND MODEL	Lowest Priced 4-door Sedan	Wheelbase (Ins.)	Tire Size (Ins.)	ENGINE															CHASSIS						
					No. of Cylinders, Bore and Stroke	Taxable HP.	Piston Displacement (Cu. Ins.)	Maximum Brake HP. at Specified R.P.M.	Compression Ratio (to—1.)	Displacement Factor §	Cylinder Head Material	Camshaft Drive Make	Piston Material	Oil Cleaner Make	Air Cleaner Make	Carburetor Make	Muffler Make	Electrical System Make	Battery Make	Clutch Type and Make	Gearset Make	Universals Type and Make	Rear Axle Type and Make	Rear Axle Ratio	Front Spring Suspension
1	Buick....37-40	976	122	6.50/16	8-3 3/32x4 1/8	30.6	248.0	100-3200	5.70	39.2	CI..	LB...	Ala..	No...	AC..	SM..	Wal..	D...	Del..	P.Own..	Own.	m-Spi...	½ Own	4.40	IC..
2	Buick....37-60	1162	126	7.00/15	8-3 1/16x4 1/16	37.8	320.2	130-3400	5.75	42.7	CI..	LB...	Ala..	No...	AC..	SM..	Wal..	D...	Del..	P.Own..	Own.	m-Spi...	½ Own	3.90	IC..
3	Buick....37-80	1418	131	7.00/16	8-3 1/16x4 1/16	37.8	320.2	130-3400	5.75	39.4	CI..	LB...	Ala..	No...	AC..	SM..	Wal..	D...	Del..	P.Own..	Own.	m-Spi...	½ Own	4.22	IC..
4	Buick....37-90	1966	138	7.50/16	8-3 1/16x4 1/16	37.8	320.2	130-3400	5.75	40.2	CI..	LB...	Ala..	No...	AC..	SM..	Wal..	D...	Del..	P.Own..	Own.	m-Spi...	½ Own	4.62	IC..
5	Cadillac..V8-60 & 65	(f)	124, 131	(t)	8-3 1/2x4 1/2	39.2	346.0	135-3400	6.25	40.9	CI..	Mor..	Ala..	Han..	AC..	Str...	Old..	D...	Del..	P.Long..	Own.	Nb-Mec.	½ Own	(u)	IC..
6	Cadillac..V8-70 & 75	(h)	131-38	7.50/16	8-3 1/2x4 1/2	39.2	346.0	135-3400	6.25	41.4	CI..	Mor..	Ala..	Han..	AC..	Str...	Old..	D...	Del..	P.Long..	Own.	Nb-Mec.	½ Own	(v)	IC..
7	Cadillac.....V12-85	3535	138	7.50/16	12-3 1/8x4	46.9	368.0	150-3600	6.00	40.8	CI..	Mor..	Ala..	Han..	AC..	DL..	Own.	D...	Del..	P.Long..	Own.	Nb-Mec.	½ Own	4.60	IC..
8	Cadillac.....V16-90	7545	154	7.50/17	16-3x4	57.6	452.0	185-3800	6.00	40.5	CI..	Mor..	Ala..	Han..	AC..	DL..	Own.	D...	D....	dp.Own..	Own.	Nb-Mec.	¾ Own	4.64	IC..
9	Chevrolet....Master	667	112¼	6.00/16	6-3 1/2x3 3/4	29.4	216.5	85-3200	6.25	35.4	CI..	Own.	CI...	No...	AC..	Car...	Own.	D...	D....	P.Own..	Own.	m-Own..	½ Own	3.73	C...
10	Chevrolet..Mas.DeL.	739	112¼	6.00/16	6-3 1/2x3 3/4	29.4	216.5	85-3200	6.25	39.0	CI..	Own.	CI...	No...	AC..	Car...	Own.	D...	D....	P.Own..	Own.	m-Own..	½ Own	4.22	IC..
11	Chrysler...Roy. C-16	910	116	6.25/16	6-3 3/8x4 1/4	27.3	228.1	93-3600	6.50	38.8	CI°.	Mor..	Ala..	Pur..	Bur.	Car...	NS..	A...	Wil..	P.B&B..	Own.	Nb-UP..	½ Own	4.10	IC..
12	Chrysler...Imp. C-14	1100	121	6.50/16	8-3 1/4x4 1/4	33.8	273.8	110-3600	6.70	41.7	Al..	Mor..	Ala..	Pur..	AC..	Str...	NS..	A...	Wil..	P.B&B..	Own.	Nb-UP..	½ Own	4.10	IC..
13	Chrysler.Cus.Im.C-15	2060	140	7.50/16	8-3 1/4x4 7/8	33.8	323.5	130-3400	6.50	....	Al..	Mor..	Ala..	Pur..	AC..	Str...	NS..	A...	Wil..	P.B&B..	Ot...	Nb-UP..	½ Own	4.55	IC..
14	Chrysler.Airflow C-17	1610	128	7.50/16	8-3 1/4x4 7/8	33.8	323.5	130-3400	6.50	40.3	Al..	Mor..	Ala..	Pur..	AC..	Str...	Bur..	A...	Wil..	P.B&B..	Ot...	Nb-UP..	½ Own	4.30	C...
15	Cord.....812	2445	125	6.50/16	8-3 1/2x3 3/4	39.2	288.6	115-3600	6.30	40.3	Al..	Whit.	Al...	No...	AC..	Str...	NS..	A...	USL.	P.Long..	Own.	Ben.....	Tu Own	4.70	IT..
16	De Soto.....S-3	870	116	6.00/16	6-3 3/8x4 1/4	27.3	223.1	93-3600	6.50	39.0	CI°.	Mor..	Ala..	Pur..	Bur.	Car...	NS..	A...	Wil..	P.B&B..	.....	Nb-UP..	½ Own	4.10	IC..
17	Dodge.....Six	820	115	6.00/16	6-3 1/4x4 3/8	25.3	217.8	87-3600	6.50	38.7	CI..	Mor..	Als..	Pur..	AC..	Str...	NS..	A...	Wil..	P.B&B..	.....	Nb-UP..	½ Own	4.10	C...
18	Duesenberg.....J	.....	142-153½	7.00/19°	8-3 3/4x4 3/4	45.0	419.7	320-4200	5.20	....	CI..	LB...	Al...	Pur..	Yes.	Str...	.....	D...	Exi..	dpLong..	Own.	m-Spi...	½ Own	....	C...
19	Ford.....V8-60	604‡	112	5 50/16	8-2.6x3.2	21.6	136.0	60-4200	6.6	30.4	Al..	Gear.	CS...	No...	Yes.	Str...	Own.	O...	Own.	P.....	Own.	m-Spi...	⅜ Own	4.44	Tr..
20	Ford.....V8-85	645‡	112	6.00/16	8-3 1/16x3 3/4	30.0	221.0	85-3800	6.12	37.9	Al..	Gear.	CS...	No...	Yes.	Str...	Own.	O...	Own.	P.Os....	Own.	m-Spi...	¾ Own	3.78	Tr..
21	Graham.....85	770	111	(s)	6-3x4	21.6	169.6	70-3500	6.80	35.7	Al..	LB...	Als..	No...	Bur.	Mar..	Old..	D...	Wil..	P.Ill....	WG..	Nb-UP..	½ Spi..	4.55	C...
22	Graham.....95	905	116	6.00/16	6-3 1/4x4	25.3	199.1	85-3800	6.70	37.9	Al..	LB...	Als..	No...	Bur.	Mar..	Old..	D...	Wil..	P.Long..	WG..	Nb-UP..	½ Spi..	4.45	C...
23	Graham.....S.C. 116	1050	116	6.25/16	6-3 1/4x4	25.3	199.1	106-4000	6.70	....	Al..	LB...	Als..	Fram	Bur.	Mar..	Old..	D...	Wil..	P.Long..	WG..	Nb-UP..	½ Spi..	4.27	C...
24	Graham.....S.C. 120	1160	116-120	6.50/16	6-3 1/4x4 3/8	25.3	217.8	116-4000	6.70	....	Al..	LB...	Als..	Fram	Bur.	Mar..	Old..	D...	Wil..	P.Long..	WG..	Nb-UP..	½ Spi..	4.27	C...
25	Hudson.....6-73	945	122	6.00/16	6-3x5	21.6	212.0	101-4000	6.25	36.8	CI°.	Ge°..	Al...	No...	AC..	Car...	Old..	A...	Nat..	P.Own†	Own.	Nb-Spi...	½ Own	4.11	C...
26	Hudson..8, 74-5-6-7	1010	122, 129	6.25/16	8-3x4 1/2	28.8	254.0	122-4200	6.25	41.2	CI°.	Ge°..	Al...	No...	AC..	Car...	Old..	A...	Nat..	P.Own†	Own.	Nb-Spi...	½ Own	4.11	C...
27	La Salle...V8, 37-50	1260	124	7.00/16	8-3 3/8x4 1/2	36.4	322.0	125-3400	6.25	41.0	CI..	Mor..	Ala..	Han..	AC..	SC...	Old..	D...	Del..	P.Long..	Own.	Nb-Mec.	½ Own	3.92	IC..
28	Lincoln.....V12	4451‡	136-145	7.50/17	12-3 1/16x4 1/2	46.8	414.0	150-3400	6.38	38.9	Al..	Ch...	Ala..	Pur..	Yes.	Str...	Own.	A...	Exi..	P.Long..	Own.	m-Spi...	FF Tim	4.58	C...
29	Lincoln-Zephyr.....	1265‡	122	7.00/16	12-2 3/4x3 3/4	36.3	267.3	110-3900	6.7	42.6	Al..	Gear.	CS...	No..	Yes.	Str...	Own.	O...	Own.	P.Os....	Own.	m-Own..	¾ Own	4.44	Tr..
30	Nash...Amb. 6, 3720	960	121	6.25/16	6-3 3/8x4 3/8	27.3	234.8	93-3400	5.67	36.2	CI..	Whit.	Als..	BS...	AC..	Str...	Wal..	A...	USL.	P.B&B..	Ot...	Nb-Mec.	½ Own	4.11	C...
31	Nash...Amb. 8, 3780	1080	125	7.00/16	8-3 1/8x4 1/4	31.2	260.8	105-3400	5.64	35.5	CI..	Dia..	Als..	BS...	Bur.	Str...	Wal..	A...	USL.	P.B&B..	Ot...	Nb-Mec.	½ Own	4.10	C...
32	Nash Lafay 400-3710	810	117	6.00/16	6-3 3/8x4 3/8	27.3	234.8	90-3400	5.61	37.4	CI..	Whit.	Als..	.....	Bur.	Str...	Wal..	A...	USL.	P.B&B..	Ot...	Nb-Mec.	½ Own	4.11	C...
33	Oldsmobile.....F37	875	117	6.50/16	6-3 7/16x4 1/8	28.4	229.7	95-3400	6.10	38.1	CI..	Whit.	Ala..	No...	AC..	Car...	Var..	D...	D....	P.B&B..	Own.	Nb-Mec.	½ Own	4.37	IC..
34	Oldsmobile.....L37	990	124	7.00/16	8-3 1/4x3 7/8	33.8	257.1	110-3600	6.20	39.1	CI..	LB...	Ala..	No...	AC..	Car...	Var..	D...	D....	P.B&B..	Own.	Nb-Mec.	½ Own	4.37	IC..
35	Packard.....115C	995	115	6.50/16	6-3 7/16x4 1/4	28.3	237.0	100-3600	6.30	39.7	CI..	Mor..	Als..	No...	AC..	CG..	Old..	D...	Wil..	P.....	Own.	Nb-Mec.	½ Own	4.36	IC..
36	Packard.....120C	1170	120	7.00/16	8-3 1/4x4 1/4	33.8	282.0	120-3800	6.50	40.7	Al..	Mor..	Als..	No...	AC..	SC...	Old..	A...	PD..	P.....	Own.	Nb-Mec.	½ Own	4.09	IC..
37	Packard...1500, 1, 2	2480	127-34-39	7.50/16	8-3 7/8x5	32.5	320.0	130-3200	6.50	41.0	Al..	Mor..	Als..	Pur..	AC..	Str...	Old..	DA.	PD..	P.....	Own.	Nb-UP..	½ Own	4.69	IC..
38	Packard...1506, 7, 8	3670	132-39-44	8.25/16	12-3 7/16x4 1/4	56.7	473.0	175-3200	6.40	46.8	Al..	Mor..	Als..	Pur..	AC..	Str...	Old..	DA.	PD..	P.....	Own.	Nb-Spi...	½ Own	4.41	IC..
39	Pierce-Arrow...1701	3375	138-144	7.00/17	8-3½x5	39.2	385.0	150-3400	6.40	37.6	Al..	Whit.	Als..	Pur..	AC..	Str...	Buf..	D‡..	Wil..	P.Long..	WG..	Nb-UP..	½ Own	4.58	C...
40	Pierce-Arrow...1702	3895	138-144	7.50/17	12-3½x4	58.8	462.0	185-3400	6.40	42.0	Al..	Whit.	Als..	Pur..	AC..	Str...	Buf..	D‡..	Wil..	P.Long..	WG..	Nb-UP..	½ Own	4.58	C...
41	Pierce-Arrow...1703	5015	147	7.50/17	12-3½x4	58.8	462.0	185-3400	6.40	40.7	Al..	Wh t.	Als..	Pur..	AC..	Str...	Buf..	D‡..	Wil..	P.Long..	WG..	Nb-UP..	½ Own	4.58	C...
42	Plymouth.....P3	665	112	5.50/16	6-3 1/8x4 3/8	23.4	201.3	82-3600	6.70	36.7	CI..	Mor..	Ala..	No...	BA..	Car...	NS..	A...	Wil..	P.B&B..	Own.	Nb-UP..	½ Own	3.90	C...
43	Plymouth.....P4	745	112	6.00/16	6-3 1/8x4 3/8	23.4	201.3	82-3600	6.70	36.5	CI..	Mor..	Ala..	Pur..	BA..	Car...	NS..	A...	Wil..	P.B&B..	Own.	Nb-UP..	½ Own	4.10	C...
44	PontiacDeL.6,37-26CA	736	117	6.00/16	6-3 7/16x4	28.3	222.7	85-3600	6.20	38.5	CI..	Mor..	CHI..	No...	AC..	Car...	BO..	D...	Del..	P.Own..	Own.	Nb-Mec.	½ Own	4.37	IC..
45	Pontiac DeL.8,37-28A	894	122	6.50/16	8-3 1/4x3 3/4	33.8	248.9	99-3800	6.20	40.5	CI..	Mor..	CHI..	No...	AC..	Car...	BO..	D...	Del..	P.Own..	Own.	Nb-Mec.	½ Own	4.37	IC..
46	Studebaker..Dict. 6	880	116	6.00/16	6-3 1/4x4 3/8	25.4	217.8	90-3400	6.00	40.2	CI..	Dia..	Ly...	Fram	AC..	SC...	Buf..	A...	Wil..	P.B&B..	WG..	Ru-Th..	½ Spi..	4.55	C...
47	Studebaker .Dict. Pl.	900	116	6.00/16	6-3 1/4x4 3/8	25.4	217.8	90-3400	6.00	40.2	CI..	Dia..	Ly...	Fram	AC..	SC...	Buf..	A...	Wil..	P.S&B..	WG..	Ru-Th..	½ Spi..	4.55	IT..
48	Studebaker....Pres.	1165	125	6.50/16	8-3 1/16x4 1/4	30.0	250.4	115-3600	6.50	39.9	Al..	Dia..	Ly...	Fram	Bur.	Str...	Bur..	D...	Wil..	P.Long..	WG..	Nb-Spi..	½ Spi..	4.55	IT..
49	Terrap..DeL.&Sup.6	790	117	6.00/16	6-3x5	21.6	212.0	96-3900	6.25	38.3	CI°.	Ge...	Al...	No...	AC..	Car...	Old..	A...	Nat..	P.Own†	Own.	Nb-Spi...	½ Own	4.11	C...
50	Willys.....37	545	100	5.50/16	4-3 1/8x4 3/8	15.6	134.2	48-3200	5.70	32.2	CI..	LB...	CI...	No...	AC..	Til...	Buf..	A...	USL.	P.B&B..	WG..	m-UP...	½ Own	4.30	C...

ABBREVIATIONS—General

°—Others also
•—Measured on rim of Flywheel
½—Semi-floating
¾—Three-quarter floating
†—Power Clutch
††—With clearance of .015 the valve is .004 off its seat.
‡—Does not include Federal Taxes
§—Computed on basis of displacement, gear ratio, effective tire diameter, and weight with normal load.

(a)—(−¼ to +½)
A—Above (rods removed from)
A—After top center
AA—Automatic adjuster
Ad—Advanced **Al**—Aluminum
Ala—Aluminum, Anode processed
Als—Aluminum with struts
Au—Automatic (b)—0 to −½
B—Below (rods removed from)
B—Before top center
Bm—Before marks on vibration damper
(c)—60, ¼—1; 65, −¼ to +¼
C—Conventional
C—Cold (Tappet clearance)
Ch—Chain
CHI—Chrome Nickel Iron
CI—Cast Iron **CS**—Cast Steel
(d)—60, ¼—1; 65, 0 to ½
dp—Double plate clutch
(e)—60, 4°51′; 65, 5°38′
(f)—60-1660, 65-2090
F—Floating (Piston Pin)
FF—Full floating
(g)—60, 155X; 65, 170X
(h)—70-25 5, 75-2815
H—Hot (tappet clearance)
IC—Independent coil
IT—Independent Transverse
(k)—Intake, .0125—Exhaust, .0156
Ly—Lynite **m**—Metal
M—Mechanical **N**—Negative
(n)—Intake, .0124—Exhaust, .0156
Nb—Needle bearing
Ot—Overdrive transmission
P—Piston (Pin Locked in)
P—Single plate clutch
PH—Power operated, hydraulic brakes
(r)—Out only
R—Rod (Pin locked in)
Ru—Rubber
(s)—2 door sedan 5.25/17, 4 door sedan 6.00/16
(t)—60, 7.00/16; 65, 7.50/16
TC—Top Center
Tr—Transverse **Tu**—Tubular
(u)—60, 3.69; 65, 4.30
(v)—70, 4.30; 75, 4.60
Var—Various
x—At 1000 R.P.M.
y—At 2800 R.P.M.
(z)—Or Champion

Tune-Up Specifications

Car Manufacturers and Supersede All Others Previously Published

Service Brake Make and Type	Steering Gear Make	Compression Pressure at Cranking Speed (Lbs.)	Spark Plug Make and Type	RINGS No. and Width Comp.	RINGS No. and Width Oil	Piston Pin Diameter	Piston Pin Locked in	VALVES Head Diameter and Seat Angle Inlet (Ins.)	Inlet Seat Angle (Degrees)	Exhaust (Ins.)	Exhaust Seat Angle (Degrees)	Stem Diameter (Ins.)	Operating Tappet Clearance Inlet	Operating Tappet Clearance Exhaust	Inlet Tappet Clearance for Valve Timing	Intake Valve Opens Before or After T.C. No. of Degrees	No. of Flywheel Teeth	IGNITION Breaker Points Gap (Ins.)	Spark Plug Gap (Ins.)	Timing Spark Occurs °TC	No. of Flyw. Teeth Spark Occurs TC	Breaker Housing	Rods Removed From	Crankpin Diameter (Ins.)	Crankpin Length (Ins.)	Capacity Crankcase (Qts.)	Capacity Cooling System (Qts.)	FRONT AXLE Caster (Degrees)	Camber (Degrees)	Toe-In (Inches)	King Pin Inclination (Degrees)	Line Number
OH	S...	120x	AC-H9....	2-3/32	2-3/16	13/16	R..	1 17/32	45	1 11/32	45	.375	.015H	.015H	††	13B...	5 1/4B	.015	.025	2B...	3° B..	Au.	A.	2	1 5/32	6	13 1/4	1/4-±3/8	-1/4, +1	0-1/16	3 1/2-4 1/2	1
OH	S...	119x	AC-H9....	2-3/32	2-3/16	7/8	R..	1 5/32	45	1 1/16	45	.375	.015H	.015H	††	14B...	6B...	.015	.025	10B..	4 1/2B.	Au.	A.	2 1/4	1 1/8	8	17	1/4-±3/8	-1/4, +1	0-1/4	3 1/2-4 1/2	2
OH	S...	119x	AC-H9....	2-3/32	2-3/16	7/8	R..	1 5/32	45	1 1/16	45	.375	.015H	.015H	††	14B...	6B...	.015	.025	10B..	4 1/2B.	Au.	A.	2 1/4	1 1/8	8	17	0-±3/8	-1/4, +1	0-1/4	4 1/2-5 1/2	3
OH	S...	119x	AC-H9....	2-3/32	2-3/16	7/8	R..	1 5/32	45	1 1/16	45	.375	.015H	.015H	††	14B...	6B...	.015	.025	10B..	4 1/2B.	Au.	A.	2 1/4	1 1/8	8	17	0-±3/8	-1/4, +1	0-1/4	4-5	4
BH	S...	(g)	AC-K7....	2-1/16	2-3/32	7/8	F..	1.87	45	1.62	45	.341	AA...	AA...	0	TC...	TC...	.015	.027	5B...	2 1/4B.	Ad.	A.	2.46	2 3/32	7	25	(c).....	(d).....	1/32-3/32	(e)..	5
BH	S...	170x	AC-K7....	2-1/16	2-3/32	7/8	F..	1.87	45	1.62	45	.341	AA...	AA...	0	TC...	TC...	.015	.027	5B...	2 1/4B.	Ad.	A.	2.46	2 3/32	7	25	(c).....	(d).....	1/32-3/32	5°38′	6
BH	S...	145x	AC-G7....	3-3/32	1-3/32	7/8	P..	1.51	45	1.39	45	.339	AA...	AA...	0	TC...	TC...	.021	.025	10B..	3B...	Ad.	B.	2 1/2	2 1/4	9	17	0-±1/4	0-1/2	1/32-3/32	5°38′	7
OP	S...	154x	AC-G6....	3-3/32	1-3/32	7/8	P..	1.51	45	1.39	45	.339	AA...	AA...	0	TC...	TC...	.016	.025	4B...	1 1/4B.	Ad.	B.	2 1/2	2 1/4	10	24	0-±1/4	0-1/2	1/32-3/32	4	8
OH	O...	112	AC-K11...	2-1/16	1-3/16	7/8	R..	1 41/64	30	1 15/32	30	11/32	.006H	.013H	.006	9B....	3 1/4B.	.020	.040	5B...	1 3/4B.	Au.	A.	2 1/4	1 5/8	5	14	2 3/4 ±1/2	1±1/2	1/16-1/8	7°10′	9
OH	O...	112	AC-K11...	2-1/16	1-3/16	7/8	R..	1 41/64	30	1 15/32	30	11/32	.006H	.013H	.006	9B....	3 1/4B.	.020	.040	5B...	1 3/4B.	Au.	A.	2 1/16	1 5/8	5	14	0	1/4-3/4	1/16-3/32	7 3/4	10
LH	G...	155x	Ch-J-8....	2-1/16	2-3/32	13/16	F..	1 23/64	45	1 13/32	45	.340	.008H	.010H	.014	TC...	TC...	.020	.025	2A...	3/4A..	Au.	A.	2 1/16	1 1/4	5	20	1 1/2	(a)	0-1/8	4 1/2-6	11
LH	G...	155x	Ch-H-10..	2-1/16	2-3/32	13/16	F..	1 23/64	45	1 13/32	45	.340	.006H	.010H	.011	2B....	3/4B..	.018	.025	3A...	1 1/4A.	Au.	A.	2 1/16	1 1/8	6	20	1 1/2	(a)	0-1/8	4 1/2-6	12
LH	G...	150x	Ch-H-10..	2-1/16	2-3/32	13/16	F..	1 23/64	45	1 13/32	45	.340	.006H	.010H	.011	2B....	3/4B..	.018	.025	5A...	2A...	Au.	A.	2 1/16	1 1/8	6	21	2	(a)	0-1/8	4 3/4-6	13
LH	G...	150x	Ch-H-10..	2-1/16	2-3/32	13/16	F..	1 23/64	45	1 13/32	45	.340	.006H	.010H	.011	2B....	3/4B..	.018	.025	5A...	2A...	Au.	A.	2 1/16	1 1/8	6	17	2	1/4-3/4	0-1/8	4 1/2-5 1/2	14
LH	G...	110	Ch-J-9.. .	2-3/32	2-5/32	7/8	F..	1 23/64	30	1 1/2	45	.342	.009	.009	.016	7 1/2B..	3 1/2..	.015	.025	3 1/2B	1 1/4..	Au.	A.	2	2 3/8	7	28	1-2 1/2	1	0-1/2r	6	15
LH	....	155x	Ch-J-8....	2-1/16	2-3/32	13/16	F..	1 21/32	45	1 13/32	45	.340	.008H	.010H	.014	TC...	TC...	.020	.025	2A...	3/4A..	Au.	A.	2 1/8	1 1/4	5	20	1 1/2	(a)	0-1/8	4 1/2-6	16
LH	....	140x	Ch-J-8....	2-1/16	2-3/32	13/16	F..	1 13/32	45	1 13/32	45	.340	.006H	.008H	.011	6A....	2 1/2A.	.020	.025	4A...	1 1/2A°	Au.	A.	2 1/16	1	5	16	2	1/4-3/4	0-1/8	4 1/2-5 1/2	17
PH	R...	....	Ch-6M....	3-1/16	1-3/16	1 1/16	F..	1 1/2	30	1 7/16	30	11/32	.015C	.015C	.025	6B....	2B...	.021	.025	1 1/2"B*	.....	Ad.	..	2 7/16	1 3/4	12	32	3	1	1/4	....	18
OM	O...	150y	Ch-H-10..	2-3/32	1-5/32	.687	F..	1.28	45	1.28	45	.279	.013C	.013C	.013	9 1/2B..	.....	.015	.025	4B...	.....	Au.	..	1.60	1.54	4	15.2	8	1	1/16-1/8	8	19
OM	O...	100	Ch-7.....	2-3/32	1-5/32	.750	F..	1 1/32	45	1 1/32	45	.310	.013C	.013C	.013	9 1/2B..	3B....	.015	.025	4B...	1 1/4B.	Au.	A.	2	1 1/32	5	22	8	1	1/16-1/8	8	20
OH	R...	115	Ch-7.....	2-3/32	1-3/16	13/16	R..	1 23/64	30	1 13/64	45	5/16	.010H	.010H	.012	4 1/2B..	1 1/2B.	.018	.025	2B...	3/4B..	....	A.	1 13/16	1 1/8	5	11	4 1/2-5 1/2	1	1/8-3/16	7 1/2	21
OH	R...	120	Ch-J-9....	2-3/32	1-3/16 1-5/32	13/16	R..	1 23/64	30	1 21/64	45	5/16	.010H	.010H	.012	2A....	3/4A..	.018	.025	TC...	TC...	....	A.	2 1/16	1 1/8	5	15	4-4 1/2	1	1/8-3/16	7 1/2	22
OH	R...	120	Ch-J-9....	2-3/32	1-3/16 1-5/32	13/16	R..	1 23/64	30	1 21/64	45	5/16	.010H	.010H	.012	4 1/2B..	1 1/2B.	.018	.025	4A...	1 1/2A.	....	A.	2 1/16	1 1/8	5	15	3-4	1	1/8-3/16	7 1/2	23
OH	R...	120	Ch-J-9....	2-3/32	1-3/16 1-5/32	13/16	R..	1 23/64	30	1 21/64	45	5/16	.010H	.010H	.012	4 1/2B..	1 1/2B.	.018	.025	4A...	1 1/2A.	....	A.	2 1/16	1 1/8	5	15	3-4	1	1/8-3/16	7 1/2	24
HM	G...	80	Ch-J-8....	2-3/32	2-1/16	3/4	F..	1 3/8	45	1 3/8	45	5/8	.008	.010	....	10°3/8B.	4B...	.020	.022	TC...	TC...	Au.	A	1 13/32	1 3/8	5	13	0-1/2	1-1 1/2	0-1/8	7	25
HM	G...	....	Ch-H-10..	2-3/32	2-1/16	3/4	F..	1 1/2	45	1 3/8	45	5/8	.008	.010	....	10°3/8B.	4B...	.020	.022	TC...	TC...	Au.	A.	1 15/16	1 3/8	7	20	.....	1-1 1/2	0-1/8	7	26
BH	S...	155x	AC-K7....	2-1/16	2-3/32	7/8	F..	1 7/8	45	1 5/8	45	.341	AA....	AA....	AA..	TC...	TC...	.015	.026	5B...	2 1/4B.	Ad.	A.	2 1/32	2 3/32	7	25	1/4-1	1/4-1	1/32-3/32	4°-51′	27
OM	O...	105	Ch-7.....	2-1/16	2-5/32	7/8	F..	1 13	45	1 11/16	45	5/16	.004C	.006C	.004	21B...	6 3/4B.	.015	.022	7B...	2 1/4B.	Au.	B.	2 1/2	2	12	32	8	1	1/16-1/8	7 1/2	28
OM	O...	100	Ch-H-10..	2-7/32	1-3/32	1 1/16	F..	1.54	45	1.54	45	.311	.013C	.013C	....	19 1/2B	6 1/4B	.015	.029	4B...	1 1/4B.	Au.	A.	2 1/8	1.57	6	27	8	3/4	1/16-1/8	4	29
BH	G...	100	AC-45....	2-1/16	2-3/32	7/8	F..	1 3/4	45	1 13/32	45	.372	.008H	.015H	.008H	24B...	4 1/4B.	.022	.027	4Bm.	1 1/4B.	Au.	A.	2	1 27/64	7	17	2 1/2	1 1/2	1/8	7	30
BH	G...	..90	AC-45....	2-1/16	1-1/16 1-3/16	7/8	F..	1 21/32	45	1 15/32	45	.372	.008	.015H	.008H	20B...	7 1/2B.	.020	.027	9Bm.	2 1/2B.	Au.	B.	2	1 13/64	7	18	2	1 1/2	1/8	7	31
BH	G...	100	AC-G8....	2-1/16	2-3/32	7/8	F..	1 21/32	45	1 17/32	45	.340	.015	.015	.015	5A....	1 1/2A.	.022	.025	TC..	TC...	Au.	A.	2	1 27/64	6	20	2 1/2	1 1/2	1/8	7	32
BH	S...	146x	AC-K9....	2-1/16	2-3/32	25/64	P..	1 9/16	30	1 23/64	45	11/32	.008H	.011	(k)	5B....	2B...	.020	.040	TC...	TC...	Au.	A.	2 1/8	1 5/8	6	16	0-N 3/4	1/8-1	1/8-3/16	4°51 1/2′	33
BH	S...	152x	AC-K9....	2-1/16	2-3/32	25/64	P..	1 9/16	30	1 23/64	45	11/32	.008H	.011	(n)	TC...	TC...	.015	.030	2B...	3/4B..	Au.	A.	2 1/8	1 5/8	7	20	0-N 3/4	1/8-1	1/8-3/16	4°51 1/2′	34
H	O...	110	AC-Y4 (z).	2-1/16	1-3/16	7/8	F..	1.57	30	1.40	45	.340	.007H	.010H	....	5B....	.....	.015	.025	4B...	1 1/2B.	Au.	..	2 3/32	1 1/4	7	17	2 1/2±1/2	1±1/4	1/8±1/8	1 1/2	35
H	O...	110	AC-Y4 (z).	2-1/16	1-1/8	7/8	F..	1 13/32	30	1 13/32	45	.340	.007H	.010H	....	5B....	.....	.015	.025	7B...	2 3/4B.	Au.	A.	2 3/32	1 1/4	7	20	2 1/2±1/2	1±1/4	1/8±1/8	1 1/2	36
H	O...	110	AC-Y4 (z).	2-1/16	2-3/32	7/8	F..	1 13/32	45	1 13/32	45	.340	.006H	.008H	....	30B...	9 3/4B.	.015	.025	6B...	2 1/2B.	Au.	B.	2 3/32	1 3/8	8	24	2 1/2±1/2	1±1/4	1/8±1/16	1 1/2	37
BPH	O...	110	AC-Y4 (z).	2-1/16	2-3/32	7/8	F..	1 11/64	45	1 23/64	45	.340	AA...	AA...	....	TC...	TC...	.020	.025	6B...	2B...	Au.	B.	2 1/32	2 1/4	10	40	(b)	1-±1/4	1/16±1/16	1 1/2	38
Ste	R...	80	Ch-J-6....	2-1/16	2-3/32	7/8	F..	1 23/64	45	1 9/16	45	.372	AA...	AA...	.010	5A....	1 1/2A.	.018	.025	2B...	1/2B..	Ad.	A.	2 1/4	1 1/4	10	25	1 1/4	1	1/8	8	39
Ste	R...	85	Ch-J-6....	2-1/16	2-3/32	7/8	F..	1 23/64	45	1 9/16	45	.372	AA...	AA...	.004	19B...	6B...	.018	.025	5B...	1 1/2B.	Ad.	A.	2 1/8	1 1/8	13	38	1 1/4	1	1/8	8	40
Ste	R...	85	Ch-J-6....	2-1/16	2-3/32	7/8	F..	1 23/64	45	1 9/16	45	.372	AA...	AA...	.004	19B...	6B...	.018	.025	5B...	1 1/2B.	Ad.	A.	2 1/8	1 1/8	13	38	1 1/4	1	1/8	8	41
LH	....	145x	Ch-J-8....	2-1/16	2-5/32	25/64	F..	1 15/32	45	1 15/32	45	.340	.006H	.008H	.011	6A....	2 1/2A.	.020	.025	4A...	1 1/2A.	Au.	A.	1 13/16	1	5	15	1-3	1/4-3/4	0-1/16	4 1/2-5 1/2	42
LH	....	145x	Ch-J-8....	2-1/8	2-3/32	25/64	F..	1 15/32	45	1 15/32	45	.340	.006H	.008H	.011	6A....	2 1/2A.	.020	.025	4A...	1 1/2A.	Au.	A.	1 13/16	1	5	15	1-3	1/4-3/4	0-1/8	4 1/2-5 1/2	43
HM	S...	141x	AC-K7....	2-1/16	1-3/16	13/16	R..	1 13/32	30	1 13/32	45	.310	.012H	.012H	.015	5B....	2B...	.020	.025	4B...	1 1/2B.	Au.	A.	2	1 1/8	6	16	N 3/4-N 1 1/4	3/4-1 1/4	0	4 1/2-5	44
HM	S...	141x	AC-K7....	2-1/16	1-3/16	13/16	R..	1 13/32	30	1 13/32	45	.310	.012H	.012H	.015	5B....	2B...	.018	.025	4B...	1 1/2B.	Au.	A.	2	1 1/16	7	19	N 3/4-N 1 1/4	3/4-1 1/4	0	4 1/2-5	45
LH	R...	105	Ch-8.....	2-1/16	1-3/16	7/8	R..	1 15/32	45	1 9/16	45	11/32	.016C	.016C	.020	15B...	5 1/2B.	.020	.025	2B...	3/4B..	Au.	A.	2 1/8	1 3/8	5 1/2	13	1 1/2	1/2	1/16-1/8	5 1/2	46
LH	R...	105	Ch-8.....	2-1/16	1-3/16	7/8	R..	1 15/32	45	1 9/16	45	11/32	.016C	.016C	.020	15B...	5 1/2B.	.020	.025	2B...	3/4B..	Au.	A.	2 1/8	1 3/8	5 1/2	13	(a)	1/2	1/8-3/16	5 1/2	47
LH	R...	....	Ch-8.....	2-1/16	1-3/16	7/8	R..	1 15/32	45	1 9/16	45	11/32	.016C	.016C	.020	15B...	5 1/2B.	.020	.025	TC...	TC...	Au.	A.	1 7/8	1 3/16	8	15 1/2	(a)	1/2	1/8-3/16	5 1/2	48
BH	G...	....	Ch-J-8....	2-3/32	2-3/16	3/4	F..	1 3/8	45	1 3/8	45	5/8	.008	.010	....	10°3/8B	4B...	.020	.022	TC...	TC...	Au.	A.	1 15/16	1 3/8	5	12 1/2	0-1/2	1-1 1/2	0-1/16	7	49
BM	G...	..87	Var.18mm.	3-3/32	1-3/16	13/16	F..	1 17/32	45	1 13/32	45	.371	.004H	.006H	.010	TC...	TC...	.018	.025	4A...	1A...	Au.	A.	1 15/16	1 13/16	4	11	3	2	3/32	7 1/2	50

MAKES OF UNITS

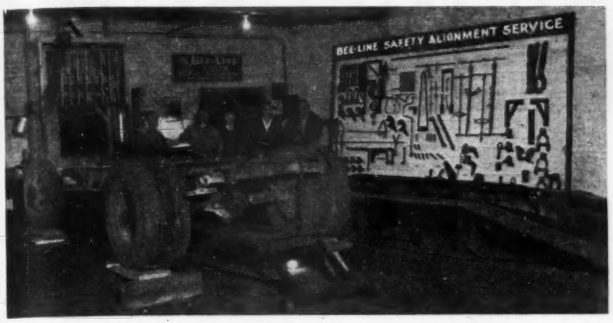
;—Owen-Dyneto for Generator and Starter
A—Autolite
AC—AC Spark Plug Co.
BA—Burgess or AC
B&B—Borg and Beck
BH—Bendix, Hydraulic
BM—Bendix, Mechanical
BO—Buffalo or Oldberg
BPH—Bendix, power operated, hydraulic
BS—Briggs & Stratton
Buf—Buffalo Pressed Steel
Bur—Burgess
Car—Carter
CG—Chandler-Groves
Ch—Champion
Col—Columbia
D—Delco-Remy
DA—Delco-Remy Generator and Starter, Autolite Coil and Distributor
Del—Delco
Dia—Continental Diamond Fiber
DL—Detroit Lubricator
Det—Detroit
Exi—Exide
G—Gemmer
Ge—General Electric Co.
Han—Handy
HM—Bendix hydraulic and mechanical combined
Ill—Illinois
LB—Link Belt
LH—Lockheed hydraulic
Mar—Marvel
Mec—Mechanics
Mor—Morse Chain Co.
Nat—National
NS—Noblitt Sparks
O—Own
OH—Own hydraulic
Old—Oldberg
OM—Own, mechanical
OP—Own, power operated
Os—Own, semi-centrifugal
PD—Presto-Lite or Delco
Pur—Purolator
R—Ross
S—Saginaw
SC—Stromberg or Carter
SM—Stromberg or Marvel
Spi—Spicer
Ste—Stewart-Warner
Str—Stromberg
Th—Thompson Products
Til—Tillotson
Tim—Timken
UP—Universal Products
Wal—Walker
WG—Warner Gear
Whit—Whitney
Wil—Willard

Motor Car Price, Weight and Body Table

Following are delivered prices at factory for cars with standard equipment and include all federal taxes with exception of Ford and Lincoln. Optional equipment, state or local taxes, transportation charges and finance charges are extra.

BODY, MAKE AND MODEL	Delivered Price	Shipping Weight
BUICK		
*—6 Wheel Equipment		
Special 40		
Sedan, 2d	914	3490
Sed. Trunk, 2d	940	3480
Sedan, 4d	950	3490
Sed., Trunk, 4d	976	3510
Bus. Coupe, 2d	868	3380
Sport Coupe, 2d	930	3445
Conv. Coupe, 2d	1011	3480
Conv. Phae., 4d	1257	3630
Century 60		
Sedan, 2d	1127	3720
Sed., Trunk, 2d	1152	3750
Sedan, 4d	1162	3750
Sed., Trunk, 4d	1188	3720
Sport Coupe, 2d	1142	3660
Conv. Coupe, 2d	1224	3715
Conv. Phae. 4d	1479	3840
Roadmaster 80		
Phae., Trk., 4d*	1756	4214
Sed. Trunk, 4d	1418	4159
For. Sed., Tk., 4d	1541	4229
Limited 90*		
Sed., Trunk, 4d	2140	4549
Lim. Trunk, 4d	2242	4599
Sed., Trunk, 4d	1966	4469
For. Sed., Tk., 4d	2140	4409
CADILLAC		
V8 Series 60		
Sport Coupe	1555	3710
Tour. Sedan, 4d	1660	3845
Conv. Coupe, 2d	1690	3745
Conv. Sedan, 4d	2020	3885
V8-Series 65		
Tour. Sedan, 4d	2090	4385
V8-Series 70		
Sport Coupe	2805	4285
Tour. Sedan, 4d	2595	4420
Conv. Coupe, 2d	2905	4325
Conv. Sedan, 4d	2960	4460
V8-Series 75		
Tour. Sedan, 5p	2815	4745
Formal Sed., 5p	3685	4745
Town Sedan, 5p	3325	4780
Conv. Sedan, 5p	3630	4980
Tour. Sedan, 7p	2970	4825
Imp. Tr. Sed., 7p	3170	4985
Sp. Tr. Sedan 7p	2810	4825
Sp. I. T. Sed., 7p	2810	4985
Bus. Tr. Sed., 8p	2745	4825
Bus. I. Tr. Sed. 8p	2950	4985
Town Car, 7p	4755	5055
V12-Series 85		
Tour. Sedan, 4d	3535	5050
Tour. Sedan, 4d	3890	5130
Im. Tr. Sed., 4d	3890	5165
Town Sedan, 4d	4045	5000
Formal Sed., 4d	4400	5050
Conv. Sedan, 4d	4350	5165
Town Car, 4d	5475	5230
V16-Series 90		
Coupe	7645	5840
A. D. Coupe	7800	6050
Conv. Sedan	8105	6100
Town Sedan	7495	6085
Sedan, 7p	7595	6190
Limousine	7800	6190
Imp. Cabriolet	8055	6210
Tn. Cabriolet, 5p.	9025	6100
Tn. Cabriolet, 7p.	9130	6390
Sedan, 5p	7545	....
Lim. Bro., 7p	9025	6190
Imp. Cab., 7p	8105	6210
Conv. Coupe, 5p.	8105	6000
CHEVROLET		
Master		
Sedan, 4d	667	2845
Coach, 2d	606	2800
Twn. Sed., Trk., 2d	624	2830
Spt. Sed., Trk., 4d	685	2885
Bus. Coupe, 2d	588	2770
Cabriolet, 2d	694	2790
CHEVROLET (Cont.)		
Master De Luxe		
Sedan, 4d	739	2935
Coach, 2d	672	2910
Tn. Sed., Trk., 2d.	690	2935
Spt. Sed., Trk., 4d.	757	2960
Bus. Coupe, 2d	655	2840
Sport Coupe, 2d.	693	2880
CHRYSLER		
Royal Six		
Bus. Coupe, 2d	810	3049
Coupe, 2d	860	3099
Conv. Coupe	1020	3274
Tour. Bro., 2d	880	3094
Brougham, 2d	870	3114
Tour. Sedan, 4d.	920	3134
Sedan, 4d	910	3124
Conv. Sedan	1355	3484
Sedan, 7p., 4d.	1145	3544
Sed. Lim., 7p., 4d	1245	....
Imperial Eight		
Bus. Coupe, 2d.	1030	3374
Coupe, 2d	1070	3449
Tour. Bro., 2d.	1070	3544
Tour. Sedan, 4d.	1100	3564
Conv. Coupe	1170	3609
Conv. Sedan, 4d.	1500	3824
Custom Imp. 8		
Sedan, 4d., 7p.	2060	4522
Sed. Lim., 4d., 7p	2160	4644
Airflow		
Sedan, 4d	1610	4225
Coupe, 2d	1610	4300
CORD		
Westc. Sed., 4d.	2445	3715
Beverly Sed., 4d.	2545	3800
Conv. Coupe, 2d.	2595	3815
Con. Pha. Sed., 2d	2645	3864
Schd. Westh. Sed.	2860	3765
Schd. Bevly. Sed.	2960	3850
Schd. Conv. Cpe.	3010	3865
Schd. Conv. Sed.	3060	3914
Cus. Berline	3060	4120
Cus. Beverly	2960	3900
S. C. Berline	3575	4170
S. C. Beverly	3375	3950
DE SOTO		
Bus. Coupe, 2d.	770	3038
Coupe, rumb., 2d	820	3088
Brougham, 2d	830	3123
Tour. Bro., 2d.	840	3148
Sedan, 4d	870	3123
Tour. Sedan, 4d.	880	3148
Conv. Coupe	975	3225
Conv. Sedan, 4d.	1300	3441
Sedan, 7p., 4d.	1120	3451
Limousine, 7p	1220	....
DODGE		
Bus. Coupe, 2d.	715	2902
Coupe, 2d	770	2967
Conv. Coupe, 2d	910	3057
Sedan, 2d	780	2992
Tour. Sedan 2d.	790	2997
Sedan, 4d	820	2982
Tour. Sedan, 4d.	830	2997
Sedan, 4d., 7p.	1075	3367
Conv. Sedan, 4d.	1230	3262
Limousine, 4d.	1175	....
FORD		
V8-60		
Tudor Sedan	544	2513
Tud. Tour. Sed.	569	2523
Fordor Sedan	604	2543
Fordor Tr. Sed.	629	2553
Coupe, 5W	529	2383
Standard V8-85		
Tudor Sedan	585	2728
Tud. Tour. Sed.	610	2760
FORD (Cont.)		
Fordor Sedan	645	2761
Fordor Tr. Sed.	670	2778
Coupe, 5W	570	2608
De Luxe V8-85		
Tudor Sedan	648	2768
Fordor Sedan	708	2783
Roadster	693	2688
Phaeton	748	2803
Coupe, 5W	633	2618
Tud. Tour. Sed.	673	2791
Fordor Tr. Sed.	733	2808
Cabriolet	693	2728
Conv. Sedan	858	2973
Conv. Cabriolet	758	2748
Club Coupe	693	2728
GRAHAM		
Crusader Series 6-85		
Tour. Sedan, 2d	690	2660
Tr. Sed., Trk., 2d	720	2675
Tour. Sedan, 4d	770	2695
Tr. Sed., Trk., 4d	795	2715
Cavalier Series 6-95		
Bus. Coupe, 2d.	850	2815
Coupe, 2d	900	2880
Conv. Coupe	945	....
Tour. Sedan, 2d	875	2930
Tr. Sed., Trk., 2d	905	2960
Tour. Sedan, 4d	905	2930
Tr. Sed., Trk., 4d	935	2945
Supercharger Series 116		
Bus. Coupe, 2d.	1015	2975
Coupe, 2d	1045	3040
Conv. Coupe	1080	....
Tour. Sedan, 2d	1020	3105
Tour. Sedan, 4d	1050	3125
Tr. Sed., Trk., 2d	1050	3105
Tr. Sed., Trk., 4d	1080	3125
Cus. Su. Chr. Series 120		
Bus. Coupe, 2d.	1105	3020
Coupe, 2d	1135	3055
Conv. Coupe	1170	....
Tour. Sedan, 4d	1160	3200
Tr. Sed., Trk., 4d	1190	3200
HUDSON		
6-73		
Bus. Coupe, 2d.	825	2760
Coupe, 3p., 2d.	870	2805
Brougham, 4d.	895	2925
Tour. Bro., 2d.	920	2925
Vict. Coupe 2d.	915	2865
Sedan, 4d	945	2990
Tour. Sedan, 4d.	970	2990
Conv. Coupe	970	2870
Conv. Bro.	1055	2945
8-74 De Luxe		
Coupe, 3p, 2d	915	3010
Brougham, 2d.	970	3105
Vict. Coupe, 2d.	985	3055
Tour. Bro., 2d.	995	3105
Sedan, 4d	1010	3135
Tour. Sedan, 4d.	1035	3135
Conv. Coupe	1050	3020
Conv. Bro.	1135	3125
8-75 Custom		
Coupe, 3p, 2d	1020	3055
Brougham, 4d	1065	3135
Vict. Coupe, 2d.	1070	3085
Tour. Bro., 2d.	1090	3135
Sedan, 2d	1110	3195
Tour. Sedan, 2d.	1135	3195
Conv. Coupe	1145	3070
Conv. Bro.	1230	3160
8-76 De Luxe		
Sedan, 4d	1040	3205
Tour. Sedan, 4d.	1065	3205
8-77 Custom		
Sedan, 4d	1140	3260
Tour. Sedan, 4d.	1165	3260
LA SALLE		
Series 37-50		
Sport Coupe, 2d	1095	3675
Tour. Sedan, 2d	1215	3780
Tour. Sedan, 4d	1260	3810
Conv. Coupe, 2d.	1290	3715
Conv. Sedan, 4d.	1620	3850
LINCOLN		
V12—136 in.	wb.	
Conv. Roadster.	4950	5335
Coupe	4950	5335
Wilby Coupe	5550	....
Sedan, 4d	4450	5690
Brunn Vict.	5550	....
V12—145 in.	wb.	
Wilby. Tour.	5550	....
Tud. Berline	5650	5850
Tud. Berline	5750	....
Tud. Sed. Lim	5950	....
Brunn Cabriolet	6650	5835
Brunn Cabriolet	6750	5810
Brunn Tour. Cab	6950	....
Brunn Brougham	6750	5530
Sedan	4750	5840
Limousine	4850	5935
Conv. Sed. LeB.	5450	....
Conv. Sed. LeB.	5650	....
Wilby. Lim.	5850	6000
Wilby Sport Sed.	6850	....
Wilby. Panel Bro.	7050	....
LINCOLN-ZEPHYR		
Coupe, 3p, 2d	1165	....
Sedan, 4d	1265	....
Coupe-sedan, 2d.	1245	....
Town Lim., 4d	1425	....
NASH		
Lafayette-400		
Coupe, 2d	705	3140
Coupe, 2d	760	3190
Vict. Sedan, 2d.	765	3200
Sedan, 4d	810	3240
Cabriolet, 2d	850	3180
Ambassador Six		
Coupe, 2d	870	3290
Coupe, 2d	910	3340
Vict. Sedan, 2d.	910	3380
Sedan, 4d	960	3400
Cabriolet, 2d	975	3320
Ambassador Eight		
Coupe, 2d	990	3590
Coupe, 2d	1030	3640
Vict. Sedan, 2d.	1030	3690
Sedan, 4d	1080	3720
Cabriolet 2d	1095	3640
OLDSMOBILE		
Six		
Bus. Coupe, 2d.	765	3220
Sedan, 2d	825	3275
Tr. Sed., Trk., 2d	850	3275
Sedan, 4d	875	3310
Tr. Sed., Trk., 4d	900	3295
Conv. Coupe, 2d.	920	3350
Club Coupe, 2d	825	3210
Eight		
Bus. Coupe, 2d.	880	3395
Club Coupe, 2d.	940	3405
Sedan, 2d	940	3480
Tour. Sedan, 2d.	965	3480
Sedan, 4d	990	3510
Tour. Sedan, 4d	1015	3495
Conv. Coupe, 2d.	1035	3530
PACKARD		
*—6 Wheel Equipment		
Model 115-C		
Tour. Sedan	1010	3310
Sedan	995	3265
Club Sedan	1000	3275
Tour. Coupe	960	3235
Sport Coupe	940	3215
Conv. Coupe	1010	3285
Bus. Coupe	895	3140
PACKARD (Cont.)		
Model 120-C		
Tour. Sedan	1185	3520
Sedan	1170	3465
Club Sedan	1175	3455
Tour. Coupe	1135	3435
Sport Coupe	1110	3415
Conv. Coupe	1185	3485
Conv. Sedan	1485	3630
Bus. Coupe	1065	3340
Model 120-CD-Del.		
Tour. Sedan	1400	3550
Club Sedan	1390	3485
Tour. Coupe	1350	3465
Tour. Sed., 7p.	1835	3835
Tour. Lim.	1985	3900
Model 1500 Super Eight		
Tour. Sedan	2480	4530
Model 1501 Super Eight		
Formal Sedan	3400	4795
Tour. Sedan	2685	4670
Club Sedan	2680	4600
Coupe	2660	4595
Coupe	2565	4585
Coupe Roadster.	2830	4580
Victoria	3310	4650
Model 1502 Super Eight		
Tour. Sed., 7p.	2860	4700
Tour. Lim., 7p.	2995	4815
Conv. Sed., 5p.	3515	4945
Bus. Sedan	2730	....
Bus. Lim.	2870	....
Model 1506 Twelve		
Tour. Sedan	3670	5335
Model 1507 Twelve		
Formal Sedan	4455	5500
Tour. Sedan	3740	5525
Club Sedan	3845	5520
Coupe	3770	5415
Coupe*	3720	5255
Coupe Roadster*	3750	5255
Victoria*	4815	5345
Model 1508 Twelve		
Tour. Sedan	4070	5600
Tour. Lim.	4275	5660
Conv. Sedan*	4975	5680
PIERCE-ARROW		
Eight Model 1701		
Sedan	3375	5675
Club Sedan	3480	5600
Coupe	3375	5645
Conv. Roadster.	3480	5590
Club Berline	3630	....
Formal Sedan	3630	....
Sedan, 7 p.	3690	5820
Enc. Dr. Lim.	3840	5860
Brunn Town Bro.	5520	5840
Conv. Sedan	4300	....
Sedan, 7p	....	5725
Twelve Model 1702		
Sedan	3895	5920
Club Sedan	4000	5850
Coupe	3895	5855
Conv. Roadster.	4000	5800
Club Berline	4155	....
Formal Sedan	4155	....
Sedan, 7 p.	4210	6065
Enc. Dr. Lim.	4360	6105
Brunn Town Bro.	6040	6085
Conv. Sedan	4820	5921
Twelve 1703		
Sedan	5015	6125
Enc. Dr. Lim	5220	6145
PLYMOUTH		
Six P3		
Coupe, 2d	580	2771
Sedan, 2d	620	2841
Sedan, 4d	2841	2841
De Luxe Six-P4		
Coupe, 2p	650	2839
Coupe, 2-4p	700	2884
Conv. Coupe, 2d.	830	2994
Sedan, 2d	715	2899
Sedan, 4d	745	2914
Tour. Sedan, 2d	725	2914
Tour. Sedan, 4d	755	2914
Sedan, 7p	995	3333
Sedan Lim.	1095	....
PONTIAC		
De Luxe Six		
Bus. Coupe, 2d.	736	3140
Sedan, 2d	785	3225
Sport Coupe, 2d.	808	3150
Tour. Sedan, 2d.	810	3210
Cabriolet, 2d	900	3220
Sedan, 4d	836	3235
Tour. Sedan, 4d.	861	3235
De Luxe Eight		
Bus. Coupe, 2d.	812	3270
Sedan, 2d	848	3330
Sport Coupe, 2d.	868	3275
Tour. Sedan, 2d.	874	3345
Cabriolet, 2d	940	3345
Sedan, 4d	894	3380
Tour. Sedan, 4d.	920	3375
STUDEBAKER		
Dictator		
Bus. Coupe, 3p	765	2965
Cus. Coupe, 3p.	820	3005
Cus. Coupe, 5p.	845	3045
Cus. Sedan, 4d.	880	3140
Cruis. Sedan, 4d	900	3130
St. Reg. Cu. Sd., 2d	850	3100
St. Reg. Cr. Sd., 2d	870	3100
President		
Cus. Coupe, 3p.	1085	3510
Cus. Coupe, 5p.	1115	3540
Cus. Sedan, 4d.	1165	3620
Cruis. Sedan, 4d.	1185	3635
St. Reg. Cu. Sd., 2d	1135	3600
St. Reg. Cr. Sd., 2d	1155	3610
State Pres.		
Sedan, Cust.	1195	....
Sedan, Cruis.	1215	....
Coupe, Cust., 3p.	1115	....
Coupe, Cust., 5p.	1145	....
TERRAPLANE		
6-71 De Luxe		
Bus. Coupe, 2d.	695	2670
Coupe, 3p, 2d	715	2715
Brougham, 2d.	735	2830
Tour. Bro., 2d.	755	2830
Vict. Coupe, 2d.	760	2765
Sedan, 4d	790	2865
Tour. Sedan, 4d.	810	2865
Conv. Coupe, 2d.	835	2765
Conv. Bro., 2d.	915	2870
6-72 Super.		
Coupe, 3p, 2d.	795	2755
Brougham, 2d.	815	2875
Tour. Bro., 2d.	835	2875
Victoria, 2d.	835	2795
Sedan, 4d	865	2905
Tour. Sedan, 4d.	885	2905
Conv. Coupe, 2d.	905	2825
Conv. Bro., 2d.	985	2915
WILLYS		
Model 37		
Coupe, 2d	491	2120
Sedan, 4d	545	2250
De L. Coupe	535	....
De L. Sedan	590	....

FACTS . . . . .



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Davenport, Iowa
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Fred A. Richards, Service Mgr.

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Dept. 200-5

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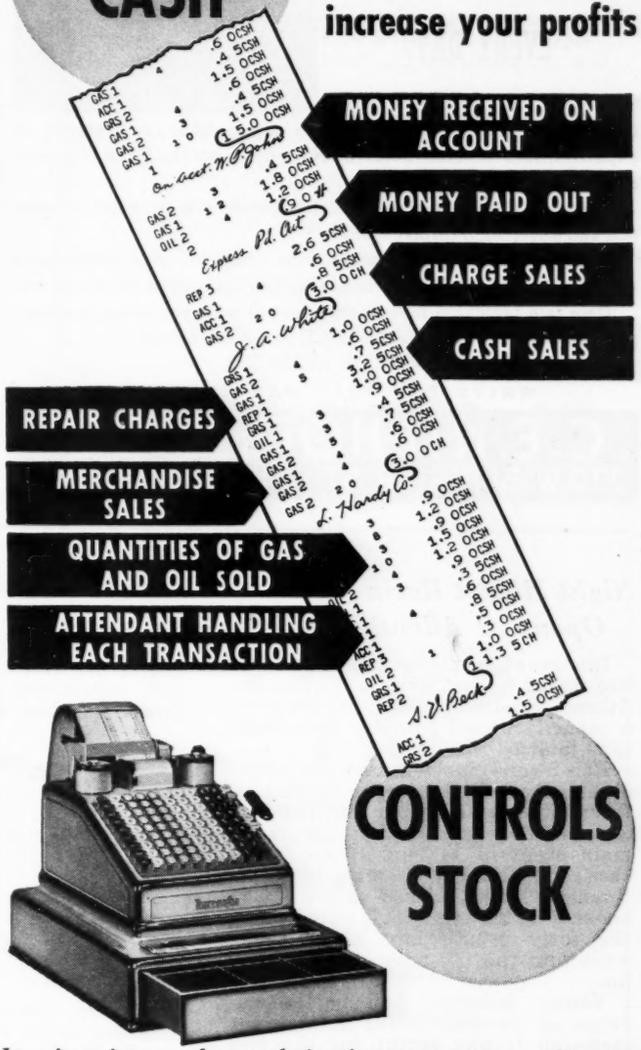

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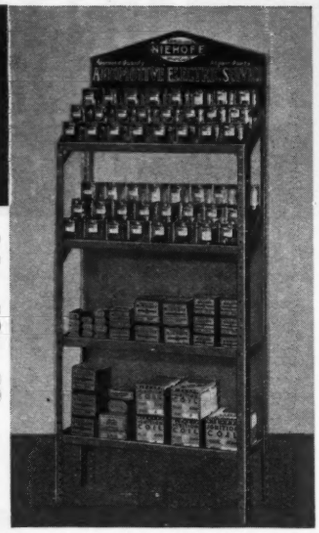

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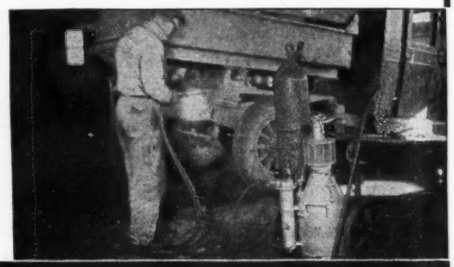

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The Sight Feed Generator Co.
Richmond, Indiana

Night Midget Racing Opens At Atlantic Stadium

Inaugurating night midget automobile racing in southern California, the Atlantic Stadium at Los Angeles drew a capacity crowd April 6. Over 6000 fans jammed the stands.

Bob Swanson, recognized as national midget racing champion, driving an Offenhauser-built Miller for the Don Lee Cadillac agency, won the 50-lap main event in 14 min. 16 sec. The race was bitterly fought by Karl Young, who was doped to win. The see-saw battle for lead lasted until the forty-seventh lap, when Young went into the pit with a broken gas line.

Young, however, had partial revenge on Swanson when he won the three-lap trophy sprint for the two fastest qualifying cars. He established a new track record for this event, getting the checkered flag in 50.01 sec.

The new flat oval 1/5 mile dirt track, replacing the figure 8 formerly used at the Atlantic Stadium, gave the drivers plenty of opportunity to use all the power of their cars. Only one minor accident marred the evening when Hardin Young hit the rail on the north turn.

Other winners were: Swanson, Hanks and Welsh each took a five-lap event; Hanson took the fifteen-lap event and Danny the six-lap event.

These tiny cars have a maximum displacement of 105 cu. in. for four-cylinder cars, and 60 cu. in. for two-cylinder cars.

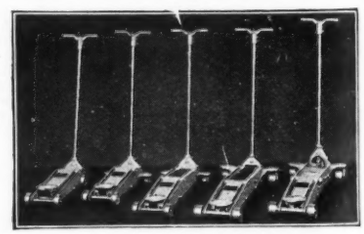
Steering Wheel Puller For Ford Cars

The National Machine & Tool Co., 801 S. Water St., Jackson, Mich., has just announced their new No. 525 Steering Wheel Puller for use on all

Ford and Lincoln-Zephyr cars. A threaded recess in the end of the tool screws on the hollow control rod and a pilot enters the shaft to protect it from injury. The puller is tapped lightly with a hammer and the wheel is easily removed.

Five Models of Hydraulic Jacks

The Hein-Werner Motor Parts Corp., Waukesha, Wis., has announced a complete line of five new models of hydraulic jacks. All models have structural steel side members. Saddles are 6½ in. in diameter, lower to 4 in. from the floor, and raise to a high point of 24½ in. Handles on all models have 90 deg. stroke, and can be locked in horizontal, 45 or 90 deg. positions.



New Tarnoff Product

The Federated Sales Service, Inc., Boston, has been appointed marketing counsel by Tarnoff Products Company, Inc., Boston.

Tarnoff Products Company, Inc., has developed a new product in the polish field called Tarnoff Wax Polisher. This new product is said to eliminate hard labor and 50-75 per cent of the time involved in the polishing. The Tarnoff Products Co., Inc., sells through selected recognized wholesalers. Manufacturers representatives are needed.

Lighting Equipment Catalog

A new 40-page catalog covering modern lighting equipment for gasoline service stations has just been released by the Goodrich Electric Co., 2900 N. Oakley Ave., Chicago, Ill. This catalog covers all types of reflectors for floodlighting, illuminating pump islands, signs, lift racks, interiors, etc. Write for your copy, catalog No. 62, which will be sent without charge.

NEW! -an improved Saylor-Beall Spray Gun

Saves Air!
Saves Time!
Saves Paint!

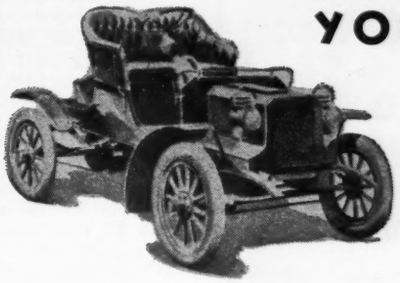
This new syphon cup gun represents an important advance in spraying equipment. It results in better coverage, saving in paint, economy of air.

It's an external atomizing gun for lacquers and fast drying materials. An entirely new principle of nozzle construction produces the same atomization as multiple-port nozzles, yet uses only half as much air. Nozzles and their adjustments range from a broad fan to a fine pattern for delicate touch-up work. When cup is removed, material hose may be attached direct to gun.

Write for folder describing the New Saylor-Beall Paint Spray Guns, Gas and Electric Driven Compressors, Material Tanks and Fittings.

SAYLOR-BEALL MANUFACTURING COMPANY
1511 East Philadelphia Ave. Detroit, Michigan

WOULD YOU TRADE YOUR CAR for THIS ?



There's a Heavy Duty Model for Garages, Repair Shops, etc.

Neither would your customers . . . but chances are, the jack they have in their car, "just in case", is just as old-fashioned . . . and clumsy . . . and hard to handle.

The Ace-Hy Hydraulic Bumper Jack is modern . . . modern in appearance . . . in ease of operation . . . in lifting capacity. Nothing to put together, nothing to lose. No projecting levers. Eliminates kneeling or crawling under car. It's a pleasure to use, and a pleasure to sell.

SPECIFICATIONS:

Lifting Capacity	3000 lbs.
Lifting Range	17 Inches
Hook Adjustment	13 Inches
Weight	18 lbs.

Packed in Cloth Bag.
10 in Shipping Container.

VULCAN MFG. CO.
SAINT PAUL • MINNESOTA

BONNEY TOOLS *are the* finest *money can buy*

•

No. 25 "CV" Engineers' Wrench Set

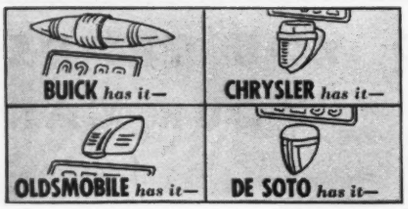
Contains 6 Bonney 'CV' Chrome-Vanadium Steel, Chrome-plated Engineers' Wrenches in sizes to handle most sizes of nuts and bolts in automobile and general work. Ask your Jobber, or send postcard for Catalog "A."

BONNEY FORGE & TOOL WORKS
Allentown, Pennsylvania

BONNEY TOOLS

The longer a repair job lasts, the more likely it is to win you a permanent customer. Pistons fitted with Thexton Expanders STAY in trim!

THEXTON
PISTON SKIRT EXPANDERS
THEXTON MANUFACTURING CO., Inc.
Minneapolis, Minnesota
Canadian Branch • Chatham, Ontario



KREGER

Now Offers the Same Snap and Distinction

No. 170

DELUXE TAIL LIGHT AND LICENSE PLATE HOLDER

Owners of late model Fords, Chevrolets, and other cars want the ornamental tail light and license plate holder featured on the center rear decks this year by Chrysler, Buick, Oldsmobile, and other cars in the higher price bracket.

The new Kreger No. 170 DeLuxe Tail Light and License Plate Holder fills the bill 100% with sparkling chromium beauty. It offers a real opportunity for dealers to satisfy their customers and make a substantial profit. Installation is easy.

List $2.75. Order sample today.

50% Discount If You Mention Jobber's Name.

THE L. F. KREGER MFG. CO.
544 W. 35th St. Chicago, Ill.

Your Jobber Has 'Em

Fuel Lines
Brass Fittings
Dash Controls
Hydrometers

from **WEATHERHEAD**
CLEVELAND, OHIO

2 MEN BLEED BRAKES?

NO!

One man can do the job "with the greatest of ease" with this tank and full set of connections. Safety valve, hose, gauge, air valve, complete.

Ask your jobber.

CURTISS & SMITH MFG. CORP.
Pottstown, Pa.

Houdaille Shocks

(*Continued from page* 29)

other car. These two points are important, for some units control the rebound of the chassis spring when the wingshaft is turned in a clockwise direction, while other units control the rebound when the wingshaft is turned in the opposite direction.

After removing the unit from the frame, punch mark both the lever and the end of the wingshaft so that they can be reassembled in the same relative position. The next step is to remove the lever. The lever is pressed on the end of the wingshaft and is held in position by means of a large nut.

Removal of the nut is a simple matter, but the lever itself is often frozen on the shaft. If special equipment is not available, place the end of the lever on an anvil and strike it several heavy blows with a hammer to "free it up" from the wingshaft. The lever can then be driven off or pressed off quite easily.

The cover, which forms the reserve chamber, is the next part to be removed. The manufacturer has a special fixture and wrench to do this. However, if these are not available, the shock absorber can be held in position by placing two studs in a large vise. The studs or pins should be so spaced that they will enter the bolt holes in the base of the instrument. With the unit securely held in position, the cover is removed by means of a large pipe wrench, or the special wrench previously mentioned.

It is now possible to unscrew the flange. A special wrench is available for this purpose or a large adjustable wrench may be used. With the flange removed it is possible to withdraw the wingshaft.

Whenever a Houdaille instrument is dismantled, the two plugs in the base, as shown in the illustration, should be examined. If loose they should be replaced, and ordinary lead solder may be used for this purpose, the solder being driven into the holes with a long punch. In this connection, whenever these plugs are loose, the instrument will have very little resistance, resulting in a soft ride.

After cleaning the shock absorber and checking the lead plugs or caulking in the base of the instrument, the shock absorber is ready for reassembling. Naturally, new gaskets should be used. With the wingshaft in place, the flange should be drawn up tight and so that the air vents will be at the top and the replenishing valves, which are of the ball check type, at the bottom, with regard to the position of the shock absorber when mounted on the car.

When the assembling is completed, the shock absorber should be refilled with clean fluid and only Houdaille fluid should be used. Otherwise, the action of the instrument will be changed and it will be impossible to obtain a good adjustment. When filling the unit, the lever should be worked back and forth so as to draw the fluid from the reserve chamber into the working chamber. Each unit should be filled until the level of the fluid reaches the bottom of the filler plug hole.

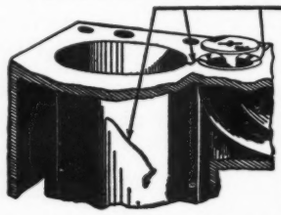
VICTOR GASKETS

PREDOMINATE in original equipment of motors for passenger cars, trucks, busses, tractors, airplanes, motor boats, and motorcycles.

VICTOR MANUFACTURING & GASKET CO.
P. O. BOX 1333 5750 ROOSEVELT ROAD, CHICAGO, U.S.A.
WORLD'S LARGEST GASKET MANUFACTURER

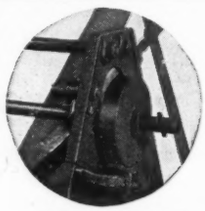
Don't Tear Down Cracked Blocks

WONDER WELD



Fixes them in ½ hr. Smaller price but better profit gets customers and coin. See any jobber. Guaranteed.

MILLER MFG. CO.
1220 Kaighn Ave., Camden, N. J.



The lowering brake on the Remco Wrecking Crane is a feature found heretofore only on the highest priced cranes. This Remco Crane offers every new invention for added strength, power, speed and safety, without high price. Manley Products Corp., State & Hay Sts., York, Pa.

REMCO
SHOP EQUIPMENT

Hydraulic Presses, Wrecking Cranes, Car Washers, Jacks, Trestles, Creepers, Oil Spray Guns, etc.

THE 60 MINUTE WAY

ZECOL WAX TO CAR BEAUTY

The Number One REPEAT item. Attractively packaged, priced right, advertised; sells because of its quality and speed and ease of application. Write today—get your share of the quick profits that are being made with ZECOL WAX and ZECOL SCUM REMOVER.

ZECOL, Inc., Milwaukee, Wis.

THE COMPLETE LINE THAT COMPLETELY SATISFIES

THE FITZGERALD MFG. CO., TORRINGTON, CONN.

FITZGERALD GASKETS

Trindl ELECTRIC ARC WELDER

3.75

Works Off Any Storage Battery or Ordinary Light Socket

This new electric arc welder is made possible by the invention of a low voltage carbon. Auto batteries may be used without removing from car. Uses about same current as four headlight bulbs. Can be used on electric light socket by using a Trindl converter in place of battery. Broken parts are simply melted together by the white hot electric arc, in just a few seconds. Produces about 7000 degrees heat.

HOTTEST FLAME KNOWN

Melts iron and steel instantly. Welds fenders, radiators, holes in bodies, milk cans, tanks, brazes broken castings. Works on anything iron, steel, brass, copper, tin or galvanized metal. Permanent repairs made for almost nothing. Used by factories in many operations. Positive money back guarantee by a responsible firm.

AGENTS

Men with cars to sell mechanics, repairmen, farmers, radio and battery shops, factories. Five minute demonstration makes sales. Up to 150% profit. Write today.

TRINDL PRODUCTS 2229-RS CALUMET AVE., CHICAGO, ILL.

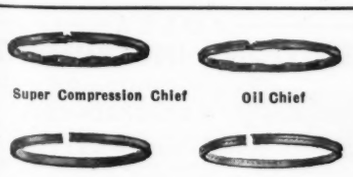
Sinko SPIN-UR-WHEEL

An attractive aid to parking, backing, turning, Spin-Ur-Wheel is a fast seller with car owners. Instantly attachable, it fits all steering wheels. In five popular colors, with and without jewel. Base finished in chrome or enamel.

Ask your jobber for full information.

SINKO TOOL & MFG. CO.
351-371 N. Crawford Ave., Chicago, Ill.

NEW C250 5 METAL DRAWER COMPLETE CHEVROLET ASSORTMENT
Write for C250 Catalogue
L-LINKERT CARBURETOR CO.
INDIANAPOLIS, INDIANA

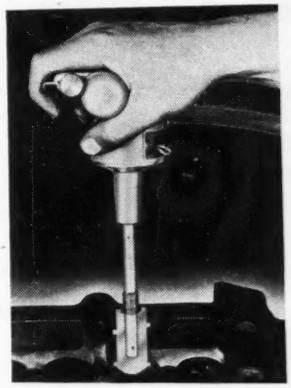


Our new Super Scraper Set for your next reconditioned motor will show you a new oil economy. They are shaped to ride over the film of oil. Your Jobber will serve you.

THE INTERNATIONAL PISTON RING CO.
CLEVELAND, OHIO

Aldon Shows Pneumatic New Valve Grinder

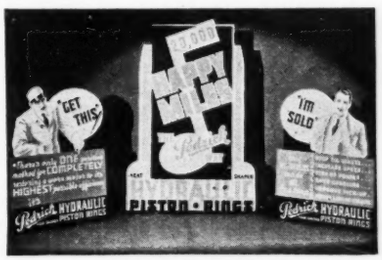
A new valve grinder operating from the air compressor has been developed by Aldon Products Co., 3000 High Street, Duncannon, Pa. The grinder weighs only 28 oz., and has a comfortable natural grip with trigger finger control. An outstanding feature of the action is that the valve never stops twice in the same place.



It is oscillated back and forth at speeds ranging from 600 to 6000 strokes per min., and automatically moves forward one-sixth of a revolution at each stroke, thus eliminating the "valleys" or "high spots" and insuring a compression tight seat. The adjustable speed range facilitates grinding hard valve seats where high speed abrasive action is essential. The complete outfit is priced at $12.75, and includes the grinder, valve lifting spring, universal valve driving chuck and rubber suction cup.

Wilkening Window Display

The accompanying illustration is the new three-piece window display being offered by the Wilkening Mfg. Co., 2000 South Seventy-first Street,



Philadelphia, Pa. The center piece is 30 x 40 in., and each side piece is 20 x 30 in. The set is silk-screened in five colors, red, yellow, white, black and gray.

"Sound Driving Practices" Booklet Issued by A.A.A.

"Sound Driving Practices," the third in a series of Sportsmanlike Driving pamphlets, issued by the American Automobile Assn., for high school courses in traffic, safety and driving, is available through AAA Motor Clubs. The booklet contains 108 pages of sound advice with 63 illustrations. Two other booklets, "The Driver" and "Driver and Pedestrian Responsibilities," together with a Teacher's Outline have already been issued. Two additional pamphlets are in prospect.

HOUSER'S BUG JUICE Dissolvent

Only 2¢ PER CAR

MELTS AWAY SMASHED INSECTS!

Turn out the best wash and polish job in your town. It takes a very few minutes with Houser's Bug Juice Dissolvent to remove those dried smashed bugs. You know how good work satisfies your trade and brings back repeat business that means money to you.

Packed in powder form. One to two teaspoonsful cleans the average car. One pound $1.00 post paid.

Houser Engineering and Mfg. Co.
Bluffton, Ind.

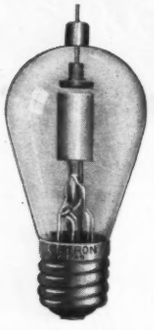
Mfgrs. of Brake Squeak Eliminators, Steering Stabilizers for Knee Action Chevrolets, Dry Lubricant, Gas Mileage Testers, Speedometer Lubrometers.

SEND TODAY FOR A FREE SAMPLE OF BUG JUICE DISSOLVENT. YOU'LL BE AMAZED HOW FAST IT REMOVES THE MOST TENACIOUS BUGS.

SEND FOR FREE SAMPLE

THIS NEW RECTIFIER IS

NEWS!



CONTINENTAL

Cetron Mercury

RECTIFIER

Type 2-RA-6

It's news because it is a really rugged rectifier unequalled in efficiency, durability, and economy. Its new and different non-sag filament is the toughest ever devised, enables it to use one-third less filament current than conventional charger bulbs. And its lower voltage drop wastes less power. You'll save many times its cost in reduced charging costs. Ask your jobber or write.

CONTINENTAL ELECTRIC CO.

GENEVA, 5, ILLINOIS

BINKS HANDY No. 5

Touch-UP

• OUTFIT •

Just the thing for touching up repaired spots on car bodies and fenders.

Cups Have SEAL TIGHT COVERS

Write for catalog with valuable information

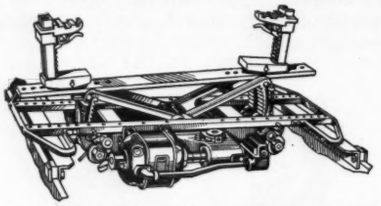
BINKS MANUFACTURING CO.

Carroll at Kedzie Ave.

CHICAGO Write Dept. AT-S ILLINOIS

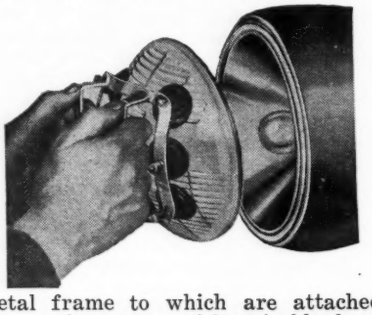
Lubricates While Car Moves

A new device to automatically raise the body of the car off the springs to permit lubricating under actual operation of the various parts has been developed by Moto-Sway Corp. of America, 430 South Green St., Chicago, Ill. It consists of an electric motor and an automatic lifting operation that lifts first one side of the car and then the other, so that the parts are in motion as the lubricant is applied.



Tool Removes Lens

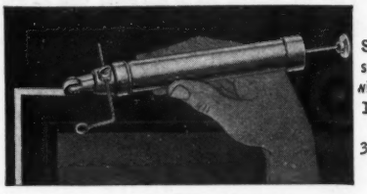
A new tool for removing and installing the new doorless lamp headlamp lenses has been announced by Rinck-McIlwaine, Inc., 16 Hudson St., New York City. It consists of a metal frame to which are attached six suction cups, with suitable handles on the opposite side. The suction cups hold the lens securely so that it can be removed and reinstalled without danger of breaking the lens and cutting the hands. Dealer Net Price $1.35.



Display Cabinet For Ignition Parts

C. E. Niehoff & Co., 230 W. Superior Street, Chicago, Ill., has introduced a new display rack for small ignition parts. The rack is finished in bright orange duco, with glass jars to hold the parts. Supplied complete with 125 pieces consisting of contact arms, screws, generator and starter brushes, etc. (service stock SS-14-E2), plus jars and display rack, price $28.

MASTER PAINT STRIPERS



• Seven stripe widths—1/32" to 3/16" •

EASY TO USE

Lays a perfect paint stripe on Autos — Trucks, etc. Stripes lend that "professional touch" to every paint job. *"Eye Appeal Means Buy Appeal."*

Sets $1.50 to $8.50.

Ask your *jobber* or write us for literature.

WENDELL MFG. CO.

2533 N. ASHLAND AVE. CHICAGO, ILL.

There's Money in Wheel Balancing Service!

Pat. No. 2036757

Many garages are making hundreds of dollars every year by rendering wheel balancing service. Why not you? The cost of an L & H Balancing Stand and Balancing Weights is surprisingly small—but the profits they will earn are surprisingly large. Investigate!

HARLEY C. LONEY CO.

16517 Wisconsin, Detroit, Mich.

WRITE for CIRCULAR!

Radiator, battery repairing and all sorts of soldering jobs easily done with the

TORIT

Acetylene Torch

No. 23

Simply connect to Presto Tank. Includes a set of 4 tips. Price, $6.75.

TORIT MFG. CO.

290 Walnut St., St. Paul, Minn.

RIESS

Automotive Service Equipment

STEER-O-MASTER

Dynamic Front Wheel Alignment

Heavy Duty Drum Lathes and Grinders
Brake Service Equipment

Money Made With Satisfied Customers With Our Equipment

RIESS MFG. CO.

Kokomo, Indiana

Unconditionally Guaranteed

UNIVERSAL

ADJUSTABLE-FIT

MUFFLERS

MUFFLERS
TAIL PIPES
AXLES · GEARS
CYLINDER HEADS
CLUTCH PLATES

U.S. PATENT No. 1,974,813. CANADIAN PATENT No. 348,899

LEAK-PROOF
BLOWOUT-PROOF

UNIVERSAL PARTS, INC. CHICAGO

ADLER

IGNITION INSTRUMENTS

ACCURATE—LOW COST

$3.95 Complete with instructions

• SYNCHROMETER

Ignition timing instrument of PROVEN MERIT. Shockproof, compact, highest quality.

$9.00 Complete with instructions

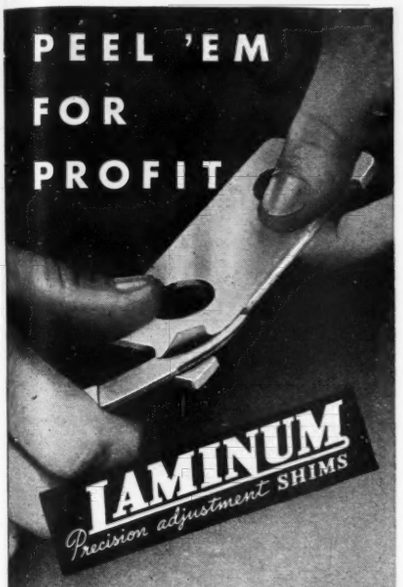
• CIRCUIT ANALYZER

— A Real Trouble-Finder — Tests condensers on or off car. Checks all electrical circuits and units on car.

SEE YOUR JOBBER OR WRITE

ADLER MFG. CO.

North Chicago, Ill.



BEARING ADJUSTMENTS THAT PAY...

Precision adjustments—quick! Right at the job. No miking, no filing!... Just peel precision laminations from the brass LAMINUM shim. Standard for all makes of engines. PEEL 'EM FOR PROFIT!

LAMINATED SHIM CO., INC.
MFRS., LONG ISLAND CITY, N. Y.

Replacement Sales by

FEDERAL-MOGUL CORP.
DETROIT 788

TOUGH TOOLS for TOUGH JOBS
BACKED BY 20 years experience

National MACHINE & TOOL CO.
JACKSON, MICHIGAN

FORD STEERING WHEEL PULLER

No. 525
Removes steering wheel instantly without chipping or cracking. Simply apply puller and tap with hammer. Saves time and prevents damage to wheel. $1.50

Be sure it's a Genuine PUROLATOR

New Reflectors For Trucks and Buses

The Vitralux Corporation of America, 485 Madison Ave., New York City, has announced a new line supplementary to its Vitralux rubber mounted passenger car reflectors. The newcomer is a Vitralux Width-Indicator for buses and trucks, and consists of 46 reflector buttons securely housed in a metal casing and are said to be capable of giving a good reflection for a distance of a thousand feet with an angularity of 70 deg.

It will be recalled that recent patent litigation between the Western Cataphote Corp. and the Vitralux Corp. of America has been settled by an exchange of licenses between the two corporations involving the use of the Vitralux Leray and the Cataphote patents.

Crankcase Oil Viscosity Numbers Announced by S.A.E.

The 1937 edition of the S.A.E. Handbook scheduled to be issued in April will contain all of the current official S.A.E. Standards and Recommended Practices, including the new and revised ones adopted by the Society in January, 1937.

Because of the extensive use of the S.A.E. viscosity number classification for automotive crankcase oils, and the issuing of specifications for 1937 by petroleum companies and others, attention is directed to a change in the classification for oils designated as S.A.E. No. 40 and S.A.E. No. 50 as follows:

The maximum viscosity at 210 deg. F., for S.A.E. No. 40 has been changed from "less than 75" to read "less than 80," and the minimum viscosity at 210 deg. F., for S.A.E. No. 50 has likewise been changed from 75 to 80. This change was effective as of Jan. 15, 1937.

Classifications are as follows:

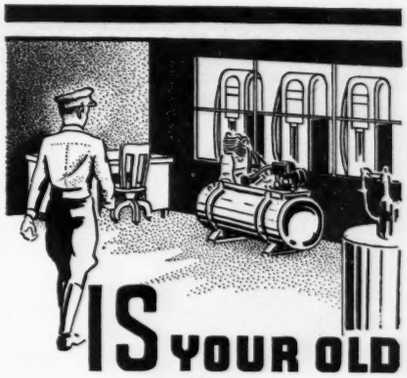
Lubricant Viscosity Numbers
S.A.E. Recommended Practice
CRANKCASE OILS

The S.A.E. Viscosity Numbers constitute a classification of crankcase lubricating oils in terms of viscosity only. Other factors of oil quality or character are not considered.

S. A. E. Viscosity Number	Viscosity Range, Saybolt Univ., Sec.			
	At 130 Deg. Fahr.		At 210 Deg. Fahr.	
	Min.	Max.	Min.	Max.
10	90	Less than 120	...	.....
20	120	" " 185	...	.....
30	185	" " 225	...	.....
40	255	.....	...	Less than 80
50	...	.....	80	" " 105
60	...	.....	105	" " 125
70	...	.....	125	" " 150

Creighton on Atlas Directorate

Maynard J. Creighton, general manager of the Zapon Division of the Atlas Powder Co. at Stamford, Conn., was elected to the board of directors of the Atlas Powder Co. at its recent annual meeting. Mr. Creighton joined the Atlas Powder Co. in 1915. In 1924 he became associated with the Zapon Co. and became general manager of the division in 1935.



IS YOUR OLD AIR COMPRESSOR SAFE?

THAT'S ONLY one question which might be asked of the owner of an old compressor. Another important question — is it efficient? Does it produce all the air you need at a reasonable cost for power?

Has it sufficient capacity to handle your needs without running more than half the time? A modern Wayne Compressor, quiet and efficient, may save enough in power alone to pay for itself. Why not investigate?

MAIL THIS COUPON

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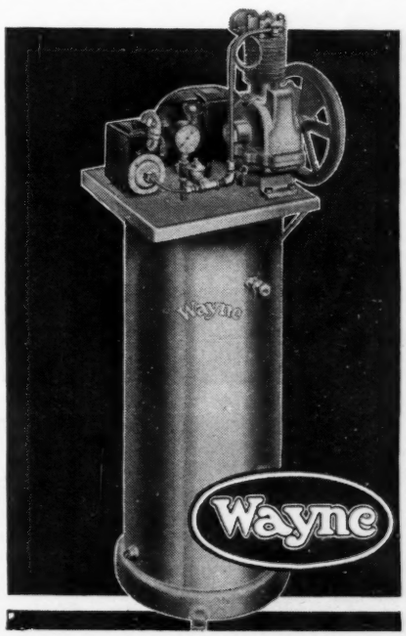

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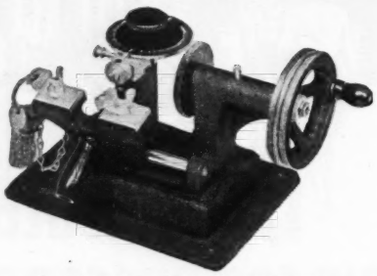

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New Thompson Movie, "Drama of Motordom"

"Drama of Motordom," a sound movie combining entertainment with worthwhile information for automotive service men, is being shown by Thompson Products, Inc., at trade meetings in many cities. For the thrills in the picture Thompson Products has drawn a second time on the news reel libraries of large producers. News reel strips of automobile racing were used in the company's film of last year, "Speeding Up."

The 1937 picture, however, shows many other romantic as well as practical roles the gasoline engine plays in the modern world. Motorized police actually shooting it out with gangsters, military tanks and submarines in action, fire fighting, air transport scenes, speed boating and paddy wagons and riots are a few of the high spots. Peter DePaolo, former A.A.A. auto racing champion who addressed many meetings personally for Thompson Products last year, is a commentator in the new film.

The real purpose of the film is worked out between the news reel shots at the beginning and end. It takes the audience inside of a jobber's machine shop, and many important operations are performed step by step on modern equipment. Engine rebuilding comes in for a special share of attention. The indispensable position the parts jobber fills, the different services he renders to the automotive maintenance trades, the big investment he must have in inventories and buildings, the numerous steps he must take to fill the smallest order, and his comparatively low margin of net profit are all brought out in an interesting, fast-moving manner.

"Drama of Motordom" was produced under the direction of Tom O. Duggan, general manager of the Thompson Products service division. It is estimated that 150,000 service men will see it at jobber-sponsored trade meetings this year.

"Why There's Money In Mufflers"

A 20-picture folder entitled "Why There's Money in Mufflers . . . and how to make it with Walker Exhaust Silencers" has been published by the Walker Mfg. Co., Michigan & Hamilton Sts., Racine, Wis. It contains an account of the development of mufflers, suggestions for checking for defective mufflers on cars, the selling points of Walker Silencers and selling helps that are available. Write for your copy.

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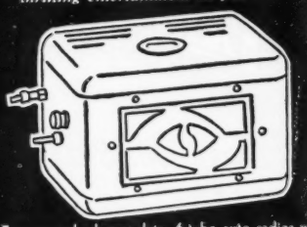

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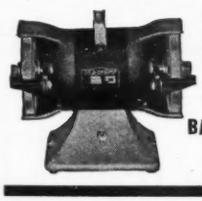

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New Radio Corporation Formed in Chicago

A group of Chicago capitalists have purchased the radio trade name Clarion and have started to manufacture a complete line of auto-radio receivers bearing the Clarion name.

The new company will be known as the Clarion Corporation and have leased executive office space in the Pure Oil Building, Chicago.

R. B. Lacey, vice-president and general manager, announced the Clarion Corporation will manufacture automobile radios to be sold only through wholesale distributors on restricted distributor territorial basis.

Mr. Lacey for the past five years has been general sales manager of the Wilcox-Gay Corporation of Charlotte, Michigan, and previously for seven years general sales manager for the Perryman Electric Company of North Bergen, New Jersey.

Tom Walker Dies

Tom Walker, who formerly traveled some of the Southern states for Raybestos, died suddenly at his home in Montgomery, Ala., early in April according to reports received at the Raybestos-Manhattan factory. Mr. Walker had been granted a leave of absence over a year ago on account of ill health and was seemingly on the mend.

Zone Managers Meet

General Sales Manager R. B. Davis, of the Raybestos Division of Raybestos-Manhattan, Inc., called in his zone managers for an important conference April 8, 9 and 10. Those making the trip to the factory included A. S. Butterworth, San Francisco; Kinsey Burr, St. Louis; Frank C. Allen, Chicago; C. H. Robinson, Baltimore; A. R. Wendell, Cleveland; and James L. McGovern, Jr., New England representative.

Estes Forms Own Company

Joseph L. Estes of Atlanta, Ga., for 10 years southeastern district manager for Cincinnati Ball Crank Co., has organized his own company and will operate as a manufacturers representative. He is past president of the Automotive Boosters Club 36 and a member of the Old Timers Club of Chicago. Mr. Estes is retaining his offices at 431 Peachtree Street, Atlanta.

Free Cooling System Booklet

National Carbon Co., Inc., 30 E. 42nd St., New York City, has recently issued a booklet entitled "Making Money With Cooling System Service." It contains instructions for cleaning and flushing radiators and blocks, as well as causes and corrections for cooling system troubles. Write for your free copy.

Free Bulletins

Technical Bulletins covering a few of the many uses for "dag" colloidal graphite in industry are published by the Acheson Colloids Corporation, 1925 Washington Ave., Port Huron, Mich. Copies may be obtained without charge by writing the company.

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All dies 1" Hex outside, so you can use with wrench when working in close quarters.
Set complete; 11 Taps, 11 Dies, 5/16 to ½ S.A.E., ⅛ Pipe, 9" Hex Die Stock, T Handle Tap Wrench.
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New Type Universal Blade, fits all arms. Blade rolls in action, no bending of rubbers. 7-ply wiping features give 100% wiping, therefore, clear vision at all times.
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Why not refinish and undercut your commutators in your own shop? Get these extra profits by adding a TRUCUT Commutator Refinisher. Takes only 5 min. to machine and mica undercut starter and generator commutators, with the TRUCUT.

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Pays for itself—accurate, fast. Complete—no expensive attachments to buy. Guaranteed. Send coupon for complete information.

A separate machine for mica undercutting starter and generator commutators.

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Many improved, outstanding features. Does work in fraction of time formerly required. Bench space 14" x 14". Send coupon for complete information.

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Furnished with shank to fit any lathe. Holds centerless armatures steady without holders or bushings. ¼ to 1" capacity.

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